

PATENT NUMBERU.S. **UTILITY** Patent Application

# ADAM RATER

APPLICATION NO. 09/615507	CONT/PRIOR D	CLASS <del>428</del> 35L	SUBCLASS 73+	ART UNIT <del>1770</del> 1711 1770 1771	EXAMINER KOR
------------------------------	-----------------	-----------------------------	-----------------	---	-----------------

Claude Hayes

Flexible thermal control composite

PTO-2040  
12/89☐ Continued on Issue Slip Inside File Jacket

**WARNING:**

The information disclosed herein may be restricted. Unauthorized disclosure may be prohibited by the United States Code Title 35, Sections 122, 181 and 368. Possession outside the U.S. Patent & Trademark Office is restricted to authorized employees and contractors only.

Form PTO-436A  
(Rev. 6/99)

FILED WITH: ☐ DISK (CRF) ☐ FICHE ☐ CD-ROM  
(Attached in pocket on right inside flap)

(FACE)

# PATENT APPLICATION



09615507

JC701 U.S. PTO

09/615507



07/13/00

INITIALS

## CONTENTS

Date Received  
(Incl. C. of M.)  
or  
Date Mailed

Date Received  
(Incl. C. of M.)  
or  
Date Mailed

ABANDONED

1. Application *ff/g/p* papers. *C-19-01*
2. *Re (3)* *12/19/01*
3. *Ext (3)* *12/19/01*
4. *Amendment (N.E)* *11/1/02*
5. *Letter* *04-10-02*
6. *Declaration* *04-10-02*
7. *Change of Address* *6/27/02*
8. *Ref. from ~~Blanket~~ ~~Patent~~* *1/24/02*
9. *ADDN* *2/3/03*
10. *Power to Inspect*
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.
- 19.
- 20.
- 21.
- 22.
- 23.
- 24.
- 25.
- 26.
- 27.
- 28.
- 29.
- 30.
- 31.
- 32.
- 33.
- 34.
- 35.
- 36.
- 37.
- 38.
- 39.
- 40.
- 41.

- 42.
- 43.
- 44.
- 45.
- 46.
- 47.
- 48.
- 49.
- 50.
- 51.
- 52.
- 53.
- 54.
- 55.
- 56.
- 57.
- 58.
- 59.
- 60.
- 61.
- 62.
- 63.
- 64.
- 65.
- 66.
- 67.
- 68.
- 69.
- 70.
- 71.
- 72.
- 73.
- 74.
- 75.
- 76.
- 77.
- 78.
- 79.
- 80.
- 81.
- 82.

(LEFT OUTSIDE)

11/30/00

POSITION	INITIALS	ID NO.	DATE
FEE DETERMINATION	1/11	7541	1/25
O.I.P.E. CLASSIFIER	K-R		7. 26. 00
FORMALITY REVIEW	JK	835	8/30/00
RESPONSE FORMALITY REVIEW			

### INDEX OF CLAIMS

✓ ..... Rejected      N ..... Non-elected  
 = ..... Allowed      I ..... Interference  
 - (Through numeral).... Canceled      A ..... Appeal  
 + ..... Restricted      O ..... Objected

Claim	Date
Final Original	
1	6/01
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	

Claim	Date
Final Original	
51	6/01
52	
53	
54	
55	
56	
57	
58	
59	
60	
61	
62	
63	
64	
65	
66	
67	
68	
69	
70	
71	
72	
73	
74	
75	
76	
77	
78	
79	
80	
81	
82	
83	
84	
85	
86	
87	
88	
89	
90	
91	
92	
93	
94	
95	
96	
97	
98	
99	
100	

Claim	Date
Final Original	
101	
102	
103	
104	
105	
106	
107	
108	
109	
110	
111	
112	
113	
114	
115	
116	
117	
118	
119	
120	
121	
122	
123	
124	
125	
126	
127	
128	
129	
130	
131	
132	
133	
134	
135	
136	
137	
138	
139	
140	
141	
142	
143	
144	
145	
146	
147	
148	
149	
150	

If more than 150 claims or 10 actions  
staple additional sheet here

(LEFT INSIDE)

## SEARCHED

Class	Sub.	Date	Exmr.
428	221 354.5 308.4 312.2 312.6 312.8 315.5 323 327 328 411.1 423.1 480 500 81	6/01	MOB
524			

## INTERFERENCE SEARCHED

Class	Sub.	Date	Exmr.

## SEARCH NOTES (INCLUDING SEARCH STRATEGY)

	Date	Exmr.
FAST Search (see attached)	6/01	MOB

(RIGHT OUTSIDE)

PATENT APPLICATION SERIAL NO. \_\_\_\_\_

U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE  
FEE RECORD SHEET

D.G.  
4-12-01

PTO-1556  
(5/87)

U.S. GPO: 1959-459-082/10144

07/24/2000 KHAELING 00000121 095:15507  
01 FC:201 345.00 DP  
05 FC:203 351.00 DP



## UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS  
UNITED STATES PATENT AND TRADEMARK OFFICE  
WASHINGTON, D.C. 20231  
www.uspto.gov



Bib Data Sheet

<b>SERIAL NUMBER</b> 09/615,507	<b>FILING DATE</b> 07/13/2000 <b>RULE</b> -	<b>CLASS</b> 428	<b>GROUP ART UNIT</b> 1772	<b>ATTORNEY DOCKET NO.</b> P-5534-27
<b>APPLICANTS</b> Claude Q.C. Hayes, San Diego, CA ;				
** CONTINUING DATA ***** THIS APPLN CLAIMS BENEFIT OF 60/143,722 07/14/1999				
** FOREIGN APPLICATIONS *****				
IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 08/30/2000				
Foreign Priority claimed <input type="checkbox"/> yes <input type="checkbox"/> no 35 USC 119 (a-d) conditions <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> Met after met Allowance Verified and Acknowledged _____ Examiner's Signature Initials		<b>STATE OR COUNTRY</b> CA	<b>SHEETS DRAWING</b> 6	<b>TOTAL CLAIMS</b> 59
			<b>INDEPENDENT CLAIMS</b> 1	
<b>ADDRESS</b> Bauer & Schaffer LLP 114 Old Country Road Mineola ,NY 11501				
<b>TITLE</b> Flexible thermal control composite				
<b>FILING FEE RECEIVED</b> 696	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees ( Filing ) <input type="checkbox"/> 1.17 Fees ( Processing Ext. of time ) <input type="checkbox"/> 1.18 Fees ( Issue ) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit	



**SOLE**

**APPLICATION  
FOR  
UNITED STATES LETTERS PATENT**

**FLEXIBLE THERMAL CONTROL COMPOSITE**

**SPECIFICATION**

To All Whom It May Concern:

Be It Known, that I CLAUDE Q. C. HAYES, a citizen of the United States residing at 3737 Third Avenue, No. 308, in the City of San Diego and State of California, have invented certain new and useful improvements in THERMAL CONTROL COMPOSITE of which the following is a specification:

09615507 071300

### Field of the Invention

5 The present invention relates to a new composition of matter, a thermal control composite comprising a polymer and an endothermic agent. The endothermic agent is distributed, dispersed and suspended within and throughout the polymer and cured to form a composite for use in insulating, thermoprotecting, heat absorbing applications on the one hand and heat maintenance applications of all types on the other.

### Background of the Invention

10 All of the prior art known to Applicant teaches the use of endothermic agents in heat sinks wherein the endothermic agents are either coated, adsorbed or packed into various supporting structures.

15 For example, Applicant's first patent U.S. Patent No. 4,449,916 discloses an endothermic agent adsorbed onto the fibers of the fabric matrix.

20 Applicant's second patent, U.S. Patent No. 5,709,914 discloses an thermal storage compound packed into an open cell network, comprising natural, synthetic or metal fibers, spheres, particles, foams, or materials capable of being formed into a container suitable for enclosing and maintaining an item's high heat.

25 There are two very serious drawbacks to the prior art. First, leakage of the endothermic or thermal storage compound to the surrounding environment can occur, if the physical integrity of the various underlying supporting structures is somehow compromised. Such leakage will diminish the effectiveness of the heat sink material and may even lead to the harm and destruction of the item or material





the heat sink material is supposed to protect, particularly if the endothermic or thermal storage compounds are harsh and corrosive.

Second, the underlying structures upon which the endothermic or thermal storage compounds are coated, absorbed, adsorbed or packed tend to be stiff and inflexible. The further coating, absorption, adsorption and packing of endothermic or thermal storage compounds on and within such structures will cause them to stiffen even more. This stiffening of the material renders them entirely unsuitable in applications where the heat sink materials must be flexible and in certain situations light, thin and drapeable.

It is therefore an object of the present invention to provide a composition of matter that can act as a heat sink/heat shield, but which will resist leaking the endothermic compound into the environment, by eliminating any possibility of a compromise of the structural integrity of the underlying carrier or support structure in the heat sink material.

It is another object of the present invention to provide a composition of matter for applications requiring a heat sink/heat shield which needs to be thin, flexible, drapeable, and/or conformable, while simultaneously protecting and insulating against high or low heat environments.

It is yet another object of the present invention to provide a composition of matter for applications requiring a heat providing material which will be thin, flexible, drapeable, and/or conformable, while simultaneously protecting and insulating against extreme cold environments.

The aforementioned objects, as well as others, will be found in detail in the following written disclosure.

## SUMMARY OF THE INVENTION

The inventive composition of matter is a flexible thermal control composite. Said composite comprises a polymer and an endothermic agent. The endothermic agent is dispersed, distributed, and suspended in the polymer. Thereafter it is cured to form a "P"olymer "C"ontaining an "E"ndothermic "A"gent (PCEA) composite. This composite now has thermal control properties that make it suitable for a multitude of thermal control applications.

Natural or synthetic polymer may be softened or liquified by being (1) heated, (2) dissolved or (3) suspended in a plasticizer or solvent. When the polymer treated in any of these manners has an endothermic agent added to it, in very specific concentrations, distributed, dispersed, suspended therein and cured, a thermal control composite i.e. a PCEA is formed. Such PCEA is in essence capable of thermal control through its ability to absorb and store heat or through its ability to first absorb heat and then release it. It does so through the use of its endothermic compounds' own inherent thermodynamic, physical and chemical properties, i.e. their latent heats of fusion, hydration, formation, decomposition, vaporization, sublimation, or its allotropic and phase change reactions; while simultaneously completely eliminating any possibility of leakage of its endothermic compounds into the environment, as said agents become an integral part of the PCEA overall physical structure.

Thus, according to the present invention there is provided a PCEA thermal control composite comprising a natural or synthetic polymer and an endothermic agent. The PCEA thermal control composite can be thin, as for example a thin or a thick film, or molded as a thick PCEA brick. When the PCEA is a thin film, then the effective distribution of the endothermic agents within said polymer is 0.0001 to 1.2 gram of endothermic or thermal storage compound per square inch of PCEA, the PCEA having a thickness of 0.05 to 2.0 mil. On the other hand, where the PCEA is a thick film or molded structure, then the effective concentration of endotherm will be 0.05%-60% by weight endotherm in PCEA.

Full details of the present invention are set forth in the following description and illustrated in the accompanying drawings.

# **BRIEF DESCRIPTION OF THE DRAWING**

FIG. 1 is a perspective view of a thin film PCEA formulated in accordance with the present disclosure;

FIG. 2 is a cross-sectional view taken along a line 2-2' of the thin film PCEA in FIG. 1;

FIG. 3 is a perspective view of a thick film PCEA formulated in accordance with the present disclosure;

FIG. 4 is a cross-sectional view taken along a line 4-4' of the thick film PCEA in FIG. 3;

FIG. 5 is a schematic of an extruding apparatus used in the extrusion of PCEA fibers;

FIG. 6. is a schematic of a second type of extruding apparatus used in the extrusion of PCEA fibers;

FIG. 7 is a perspective view of a PCEA fiber formulated and extruded in accordance with the present disclosure;

FIG. 8 and FIG. 9 are top plan views of PCEA materials assembled, woven or knit using PCEA fibers;

FIG. 10 is a schematic of a delivery and adhesion method of a small particulate PCEA onto a plastic substrate.

FIG. 11 is a schematic of a delivery and adhesion method of a large particulate PCEA onto a plastic substrate.

FIG. 12 is a schematic of the delivery of a PCEA into the inner walls of a home.

FIG. 13 is a perspective view of a container incorporating one of the embodiments of the PCEA;

FIG. 14 is a somewhat schematic, perspective view of a winter or hunting jacket, incorporating a preferred embodiment of the present inventive PCEA;



FIG. 15 is a cross-sectional view taken along 15-15' of the jacket in Fig. 14, showing another use of the PCEA, in the form of a mulch;

FIG. 16 is a somewhat schematic side view of the endothermic agent in the PCEA absorbing heat, thereby preventing the heat from reaching the heat sensitive device;

FIG. 17A and FIG 17B are a somewhat schematic view of the inventive PCEA showing the recyclable endothermic agent first absorbing the heat (Fig. 17A) and then releasing the heat to the cold sensitive device, thereby maintaining the temperature of the cold sensitive device constant (Fig. 17B);

FIG.18 is a perspective view of a thin film PCEA formulated in accordance with the present disclosure and contacted to a thermally conductive material, only on one side;

FIG. 19 is a perspective view of a thin film PCEA formulated in accordance with the present disclosure and sandwiched between two layers of thermally conductive material;

FIG. 20 is a cross-sectional view taken along a line 3-3' of the thin film PCEA/thermally conductive material in FIG. 18, wherein the heat of the hot spot applied to one end of the PCEA is diffused across the entire surface of the PCEA and thereafter is absorbed by the PCEA's endothermic agent;

FIG. 21 is a cross-sectional view taken along a line 4-4' of the thick film thermally conductive material/PCEA sandwich of FIG. 19, wherein the heat of the hot spots applied to one end of the sandwich is diffused across the entire surface of the PCEA and thereafter is absorbed by the PCEA's endothermic agent.

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

The inventive thermal control composite i.e. the PCEA material 10 of Fig. 1, Fig. 2, Fig. 3, and Fig. 4 shows the endothermic agent 11 dispersed, distributed and suspended within a polymer or plastic 12.



(a) The polymer or plastic.

The plastic or polymer 12 of the PCEA material 10 may comprise any natural or synthetic polymer or a mixture thereof. Such natural and synthetic polymers comprise: all latexes including those used in paint; fluoropolymers such as various TEFLON® species, specifically polytetrafluoroethylene (PTFE), polyfluoroacetate (PFA) and fluoroethylpropylene(FEP) and other fluorinated plastic films having similar thermal stability, i.e. FEP: -200 DEGREES C TO 200 DEGREES C and PFA: -200 DEGREES C TO 250 DEGREES C, that are well known in the art; expanded TEFLON®; high temperature fluoroelastomers such as VITON® and other highly thermoresistant polymers and plastics well known in the art; elastomers such as SILICONE® species specifically polydimethylsiloxane and polymethylphenylsiloxane and other siloxanes well known in the art; polyimides such as KAPTON®; POLYESTERS® such as MYLAR®; high density polymers such as TIVAR® and SPECTRA®; and other polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides or sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetherketones, phenolics, polystyrenes, cellulose, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, BRICKLITE®, polymeric and plastic materials well known to those skilled in the art of plastic materials. Preferably though the carrier plastic or polymer 13 should be TEFLON®, SILICONE®, or VITON®.

These polymers can be photo, thermally or chemically cured. More importantly however, they have a molecular structure consisting of long chains of mostly linear molecules, which after being relaxed by either controlled heating, dissolution or suspension in a plasticizer or solvent, provide the interstitial spaces, through which the endothermic or thermal storage compounds weave and are distributed prior to curing and the final formation of the PCEA.

(b) The endothermic agent.

An endothermic compound or agent is by definition a compound that absorbs heat. The endothermic agents of the present invention can be strict



endotherms, i.e. they absorb and retain heat without releasing it into the surrounding environment. Or they can be recyclable endotherms, such as phase change materials, where they absorb heat initially and then they release the heat, if they are subjected to an environmental temperature differential.

5

The endothermic agents of the present invention comprise the following: oxidized and unoxidized polymers; oxidized and unoxidized homopolymers of ethylene polymer compounds; carbon monoxide-bonded copolymers; micronized polyethylene waxes such as stearic acid; waxes derived from petroleum; ethylene-bis-stearamide; N,N-ethylene-bis-stearamide; various tars; high molecular weight oils and hydrocarbons; polyvinyl alcohols; oxidized and unoxidized polyethylene homopolymers; carnauba wax; aluminum hydroxide, calcium hydroxide, potassium hydroxide, lithium hydroxide and the mixtures thereof; boric acid; dodecaborane, paraldehyde, paraformaldehyde, trioxane and the mixtures thereof; lithium formate, lithium acetate, lithium carbonate, calcium carbonate, silicon carbonate, magnesium carbonate, sodium bicarbonate and the mixtures thereof; salts of acetic acid, salts of formic acid, salts of boric acid and the mixtures thereof; lithium chloride trihydrate, lithium nitrate trihydrate, sodium carbonate decahydrate, sodium borate decahydrate, hydrated epsom salts, magnesium nitrate hexahydrate, beryllium sulfate tetrahydrate, sodium phosphate dodecahydrate, calcium chloride hexahydrate, zinc sulfate heptahydrate, magnesium chloride hexahydrate, sodium sulfate decahydrate, aluminum oxide trihydrate, aluminum sulfate decahydrate, aluminum fluoride trihydrate, and the mixtures thereof; and any eutectic mixtures of any of these materials or families of materials including salts with melting points below 550 degrees Celsius.

005415507 "071100  
131500

25

These endothermic agents may be micronized and added to the polymer(s) after said polymer(s) have been relaxed by either controlled heating, dissolution or suspension in a plasticizer or solvent. The endothermic agents are then subjected to a mixing process by which they are distributed through and suspended in the polymer(s)' interstitial spaces, or in the interstitial spaces of

30

the outer surface of the polymer(s), and fixed therein through final curing steps which result in the inventive thermal control composite i.e. the PCEA.

5 The ultimate effective concentration of the endotherm in the PCEA is determined on a case by case application basis by such factors as: the particular application i.e. whether the application requires the absorption of heat or the release of heat, the needed heat capacity of the application, the type of polymer used, the particulate size of the endotherm, and the needed flexibility and use of the novel PCEA. Thus, when seeking a drapeable PCEA having a thickness of 10 0.3 to 1.0 mil for a heat absorbing/heat protective clothing application the carrier plastic or polymer may be a fluoroelastomer, and the concentration of the endothermic agent or thermal storage compound may range from 0.0001 to 1.2 grams of endotherm per square inch of PCEA; with a preferred concentration of 0.01 to 0.06 grams of endotherm per square inch of PCEA.

15 On the other hand, when seeking a flexible PCEA having an observable thickness of, for example 1 inch, then the carrier polymer may be a silicone and the effective concentration of the endotherm in the PCEA will be 0.05%-60% by weight endotherm in PCEA; with a preferred concentration of 20% by weight endotherm in PCEA, for extreme maximum flexibility relative to the 20 highest heat capacity.

25 The heat absorption/heat protective and/or the heat release/heat preservation properties of the present inventive PCEA materials become readily apparent in the Test Examples below, which represent various embodiments of the inventive PCEAs.

(c) Embodiments of the Invention.

30 A series of different PCEAs were prepared in accordance with the principles and requirements as described above. Specifically, natural or synthetic polymers were selected from the group of polymers set forth above. These polymers in turn were softened or liquified by (i) heat, (ii) solution in a

solvent or (iii) suspension in a plasticizer, using conventional methods of softening and liquification already known in the art of polymer handling and processing.

To these softened or liquified polymers, in turn, were added an endothermic or a recyclable endothermic agent, preferably micronized, selected from the group of endotherms or thermal storage compounds set forth above, in specific concentrations. The polymer and endotherm combinations were then mixed thoroughly to insure the distribution, dispersal, and suspension of the endotherms in the polymers's interstitial spaces; said spaces being formed during the softening of the polymers' long chains of mostly linear molecules. The mixtures were then molded and cured into PCEA thin and thick films, PCEA bricks, various shaped PCEA mulches or extruded, or extruded and spun into PCEA fibers. Alternatively, the PCEA mixtures were contacted, painted and cured onto a polymer substrate, so that upon cooling, or evaporation of the solvent or the plasticizer, the PCEA is literally adsorbed only on the surface of the underlying polymer substrate.

These PCEAS were then tested to determine their heat absorbing capacities and performance, using standard calorimeter testing procedures. The results of some of these PCEA calorimeter tests were as follows:

TEST EXAMPLE I  
POLYMER/BORIC ACID FILM

POLYMER: VITON OR OTHER FLUOROELASTOMER  
ENDOTHERMIC AGENT: BORIC ACID I.E. A STRICT ENDOTHERM.  
LATENT HEAT OF DECOMPOSITION OF BORIC ACID: 400 CAL/G  
THICKNESS OF FILM: 0.001 INCH  
CONCENTRATION OF BORIC ACID IN THE PCEA: 0.03 GM OF BORIC  
ACID PER SQUARE INCH OF PCEA.  
AMOUNT OF HEAT ABSORBED: 10,368 CAL/SQ.YD; 8 CAL/SQ. IN.





TEST EXAMPLE II  
POLYMER/WAX FILM

POLYMER: VITON OR OTHER FLUROELASTOMER  
ENDOTHERMIC AGENT: WAX I.E. RECYCLABLE ENDOTHERM  
CAPABLE OF ABSORBING HEAT AND THEN RELEASING IT.  
LATENT HEAT OF FUSION OF WAX: 30CAL/G  
THICKNESS OF FILM: 0.001 INCH  
CONCENTRATION OF WAX IN THE PCEA: 0.03 GM OF WAX PER  
SQUARE INCH OF PCEA.  
AMOUNT OF HEAT ABSORBED: 1166.4 CAL/SQ. YD; 0.9 CAL/SQ. IN.

TEST EXAMPLE III  
SILICONE/BORIC ACID FILM

POLYMER: SILICON  
ENDOTHERMIC AGENT: BORIC ACID I.E. A STRICT ENDOTHERM  
LATENT HEAT OF DECOMPOSITION OF BORIC ACID: 400 CAL/G  
THICKNESS OF FILM: 0.001 INCH OR 1.0 MIL  
CONCENTRATION OF BORIC ACID IN THE PCEA: 0.05 GM OF BORIC  
ACID PER SQUARE INCH OF PCEA.  
AMOUNT OF HEAT ABSORBED: 20 CAL/SQ. IN.

TEST EXAMPLE IV  
SILICONE/ENDOTHERM PCEA

POLYMER: SILICONE  
ENDOTHERMIC AGENT: HOMOPOLYMER I.E. A RECYCLABLE  
ENDOTHERM  
LATENT HEAT OF FUSION OF THE HOMOPOLYMER: 80 CAL/GM.  
PREPARATION: THE HOMOPOLYMER IS SUSPENDED IN A SILICONE  
GEL AND CURED.  
RESULTS:

- (A) THE FLEXIBILITY VALUES ARE A DIRECT  
FUNCTION OF THE RATIO OF ENDOTHERM  
TO SILICONE;
- (B) AT A HOMOPOLYMER CONCENTRATION  
OF 10% BY WEIGHT HOMOPOLYMER IN  
SILICONE PCEA THE AMOUNT OF HEAT  
ABSORBED IS 8 CAL/100 GMS OF PCEA;
- (C) AT A HOMOPOLYMER CONCENTRATION  
OF 20% BY WEIGHT HOMOPOLYMER IN  
SILICONE PCEA, THE AMOUNT OF HEAT  
ABSORBED IS 16 CAL/100 GMS OF PCEA;

- (D) AT A HOMOPOLYMER CONCENTRATION OF 35% BY WEIGHT HOMOPOLYMER IN SILICONE PCEA, THE AMOUNT OF HEAT ABSORBED IS 28 CAL/100 GMS OF PCEA;
- (E) AT A HOMOPOLYMER CONCENTRATION OF 60% BY WEIGHT HOMOPOLYMER IN SILICONE PCEA, THE AMOUNT OF HEAT ABSORBED IS 48 CAL/100 GMS OF PCEA. NOTE THAT THE PCEA IS BRITTLE AND FLAKES I.E. MORE SUITABLE FOR MULCH TYPE APPLICATIONS;

TEST EXAMPLE IV  
SILICONE/BORIC ACID PCEA

POLYMER: SILICONE

ENDOTHERMIC AGENT: BORIC ACID I.E. A STRICT ENDOTHERM

ENDOTHERM: BORIC ACID HAVING A LATENT HEAT OF FUSION OF 400 CAL/GM AT 140 DEGREES CELSIUS.

PREPARATION: THE BORIC ACID IS SUSPENDED IN A SILICONE GEL AND CURED.

RESULTS:

- (A) THE FLEXIBILITY VALUES ARE A DIRECT FUNCTION OF THE RATIO OF ENDOTHERM TO SILICONE;
- (B) AT A BORIC ACID CONCENTRATION OF 20% BY WEIGHT BORIC ACID IN SILICONE PCEA THE AMOUNT OF HEAT ABSORBED IS 80 CAL/100 GMS OF PCEA.

TEST EXAMPLE V  
FLUOROCARBON/CARBON MONOXIDE COPOLYMER FILM

POLYMER: FLUOROCARBON

ENDOTHERMIC AGENT: CARBON MONOXIDE COPOLYMER I.E. A RECYCLABLE ENDOTHERM

LATENT HEAT OF FUSION OF CARBON MONOXIDE COPOLYMER: 103 CAL/G

THICKNESS OF FILM: 0.001 INCH

CONCENTRATION OF CARBON MONOXIDE COPOLYMER IN THE PCEA: 0.06 GM PER SQUARE INCH OF PCEA.

AMOUNT OF HEAT ABSORBED: 6.2 CAL/SQ. IN.

NOTE: Carbon monoxide copolymer is a recyclable endotherm. This means that after it has absorbed 6.2 cal/sq.in. the PCEA can be used to transfer 6.2 cal/sq.in. to a cold sensitive device, animal, or human, which is being exposed to extreme cold conditions.

TEST EXAMPLE VI  
FLUOROCARBON/HOMOPOLYMER FILM

POLYMER: FLUOROCARBON  
LATENT HEAT OF FUSION OF HOMOPOLYMER: 80 CAL/G  
THICKNESS OF FILM: 0.001 INCH  
CONCENTRATION OF HOMOPOLYMER IN THE PCEA: 0.06 GM PER SQUARE INCH OF PCEA.  
AMOUNT OF HEAT ABSORBED: 4.8 CAL/SQ. IN.

NOTE: The Homopolymer is a recyclable endotherm. This means that after it has absorbed 4.8 cal/sq. in. the PCEA can be used to transfer 4.8 cal/sq. in. to a cold sensitive device, animal, or human, which is being exposed to extreme cold conditions.

TEST EXAMPLE VII  
SILICONE/HOMOPOLYMER:CARBON MONOXIDE COPOLYMER PCEA

POLYMER: SILICONE  
ENDOTHERMIC AGENTS: HOMOPOLYMER AND CARBON MONOXIDE COPOLYMER I.E. RECYCLABLE ENDOTHERMS  
LATENT HEAT OF FUSION OF THE HOMOPOLYMER IS 80 CAL/GM; CARBON MONOXIDE COPOLYMER HAVING 103 CAL/GM; 50:50 RATIO HAS A LATENT HEAT OF FUSION OF 91.5 CAL/GM.  
PREPARATION: THE HOMOPOLYMER AND CARBON MONOXIDE COPOLYMER ARE SUSPENDED IN A SILICONE GEL AND CURED.  
RESULTS:

- (A) THE FLEXIBILITY VALUES ARE A DIRECT FUNCTION OF THE RATIO OF ENDOTHERMS TO SILICONE;  
(B) AT ENDOTHERM CONCENTRATION OF 20% BY WEIGHT THE AMOUNT OF HEAT ABSORBED AND CAPABLE OF BEING RELEASED IS 1830 CAL/100 GMS OF PCEA.



It is clear from the above that PCEAs will perform superbly in applications directed to the absorption of heat. Furthermore, when the applications call for near isothermal conditions, i.e. two dimensional thermal conductivity or increased thermal conductivity along the surface plane, then any PCEA set forth in the examples above, or formed in accordance with the present disclosure, can be coupled with a metalized or thermally conductive material. This will diffuse the heat of hot spots across the entire surface of the PCEA. In fact, it was found that when a thermally conductive material was contacted to a 1.0 mil thick PCEA film comprising a homopolymer endotherm whose concentration was 0.02 gm of homopolymer endotherm per sq. in., the homopolymer (heat of fusion: 80 cal/gm) was capable of rapidly absorbing 2073.6 cal over 1 sq. yard; regardless of where the thermal flux was applied on the surface of the PCEA.

When the PCEA applications require some kind of ventilation and breathability, as for example in clothing, then the PCEA film can be pierced or provided with tears, holes, or openings. Such openings do not compromise the heat absorption performance of the PCEAs, nor do they affect the overall structural integrity of the application.

(d) Invention Applications.

The inventive PCEAs can be formed into thin and thick films. They may be drawn, molded or spun into fibers of all dimensions. They can be formed and chopped into PCEA mulch; the size of the mulch varying with the particular application. They can be molded into a brick or gasket. In fact, various modifications can be made to the present invention, as will be apparent to those skilled in the art; modifications which will depend on and become readily apparent from the particular applications for which the inventive PCEAs are intended for.

Thus, depending on the characteristics of the PCEA prepared, i.e. the heat capacity of its endothermic agent(s), the polymer(s) used, its form size and



shape, the PCEA can be used for thermal control in protective clothing, winter clothing, boats, furniture, pipes, diving suits, hoses, auto interiors, fire walls, chemical processes, kitchen clothing and gear. Or, the PCEA can be used for environmental control in paint, pipes, tubs, walls as shown for example in Fig. 12, shipping containers, medical devices, food, homes, aircraft, automobiles and tanks. Finally the inventive PCEAs can be used as protective pads in gloves, shoes, lab coats, fire gear and even ablative surgery; while, recyclable PCEAs, which are endotherms that make use of their latent heats of fusion, are ideal in use for dive suits and warm weather clothing, tents and gear.

In fact, the applications and uses of the inventive PCEA are infinite; limited only by the imagination of man and his ability to design new ways to protect in extreme environmental conditions, either hot or cold. Thus, the PCEA can also be formed into surfaces for use under carpets or adhered to carpets using a method such as that portrayed in Fig. 10 and Fig. 11 in an effort to keep homes in as near an isothermal situation as possible. On the other hand, the PCEA may also be used as a means of camouflage by the removal of the heat signature of military combat gear, troops and military vehicles; or as a flexible thermal shield for the protection of spacecraft electronics and satellites from the harmful effects of solar radiation. Finally, PCEA fibers can be knit, spun or woven into protective cloth as shown in Fig. 8 and Fig. 9, whose applications can also be infinite.

Accordingly, while only a few embodiments of the present invention have been shown and described, it is to be understood that many changes and modifications may be made thereunto without departing from the spirit and scope of the invention as disclosed herein.



The invention claimed is:

1. A flexible thermal control composite comprising an endothermic agent and a polymer, wherein said endothermic agent is distributed, dispersed and suspended within said polymer.

2. The flexible thermal control composite of claim 1, further comprising a thermally conductive material contacted to said flexible thermal control composite.

3. The flexible thermal control composite of claim 1, wherein the endothermic agent is recyclable.

4. The flexible thermal control composite of claim 2, wherein the endothermic agent is recyclable.

5. The flexible thermal control composite of claim 1, wherein the endothermic agent is micronized.

6. The flexible thermal control composite of claim 2, wherein the endothermic agent is micronized.

7. The flexible thermal control composite of claim 3, wherein the recyclable endothermic agent is micronized.



8. The flexible thermal control composite of claim 4, wherein the recyclable endothermic agent is micronized.

9. The flexible thermal control composite of claim 1, wherein said endothermic agent is selected from the group consisting of oxidized polymers, unoxidized polymers, oxidized homopolymers, unoxidized homopolymers of ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene homopolymers, unoxidized polyethylene homopolymers, carnauba wax, aluminum hydroxide, calcium hydroxide, potassium hydroxide, lithium hydroxide, boric acid, paraldehyde, paraformaldehyde, trioxane, lithium formate, lithium acetate, lithium carbonate, calcium carbonate, silicon carbonate, magnesium carbonate, sodium bicarbonate, salts of acetic acid, salts of formic acid, salts of boric acid, lithium chloride trihydrate, lithium nitrate trihydrate, sodium carbonate decahydrate, sodium borate decahydrate, hydrated epsom salts, magnesium nitrate hexahydrate, beryllium sulfate tetrahydrate, sodium phosphate dodecahydrate, calcium chloride hexahydrate, zinc sulfate heptahydrate, magnesium chloride hexahydrate, sodium sulfate decahydrate, aluminum oxide trihydrate, aluminum sulfate decahydrate, aluminum fluoride trihydrate, aluminum nitrate nonhydrate and any eutectic blends of any of these materials or families of materials including salts with melting points below 550 degrees Celsius.



10. The flexible thermal control composite of claim 2, wherein said  
40 endothermic agent is selected from the group consisting of oxidized polymers,  
unoxidized polymers, oxidized homopolymers, unoxidized homopolymers of  
ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized  
polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-  
ethylene-bis-stearamide, tars, high molecular weight oils, high molecular weight  
45 hydrocarbons, polyvinyl alcohols, oxidized polyethylene homopolymers, unoxidized  
polyethylene homopolymers, carnauba wax, aluminum hydroxide, calcium  
hydroxide, potassium hydroxide, lithium hydroxide, boric acid, paraldehyde,  
paraformaldehyde, trioxane, lithium formate, lithium acetate, lithium carbonate,  
calcium carbonate, silicon carbonate, magnesium carbonate, sodium bicarbonate,  
50 salts of acetic acid, salts of formic acid, salts of boric acid, lithium chloride  
trihydrate, lithium nitrate trihydrate, sodium carbonate decahydrate, sodium borate  
decahydrate, hydrated epsom salts, magnesium nitrate hexahydrate, beryllium  
sulfate tetrahydrate, sodium phosphate dodecahydrate, calcium chloride  
hexahydrate, zinc sulfate heptahydrate, magnesium chloride hexahydrate, sodium  
55 sulfate decahydrate, aluminum oxide trihydrate, aluminum sulfate decahydrate,  
aluminum fluoride trihydrate, aluminum nitrate nonhydrate and any eutectic blends  
of any of these materials or families of materials including salts with melting points  
below 550 degrees Celsius.

11. The flexible thermal control composite of claim 5, wherein said  
60 micronized endothermic agent is selected from the group consisting of micronized  
oxidized polymers, unoxidized polymers, oxidized homopolymers, unoxidized





homopolymers of ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene homopolymers, unoxidized polyethylene homopolymers, carnauba wax, aluminum hydroxide, calcium hydroxide, potassium hydroxide, lithium hydroxide, boric acid, paraldehyde, paraformaldehyde, trioxane, lithium formate, lithium acetate, lithium carbonate, calcium carbonate, silicon carbonate, magnesium carbonate, sodium bicarbonate, salts of acetic acid, salts of formic acid, salts of boric acid, lithium chloride trihydrate, lithium nitrate trihydrate, sodium carbonate decahydrate, sodium borate decahydrate, hydrated epsom salts, magnesium nitrate hexahydrate, beryllium sulfate tetrahydrate, sodium phosphate dodecahydrate, calcium chloride hexahydrate, zinc sulfate heptahydrate, magnesium chloride hexahydrate, sodium sulfate decahydrate, aluminum oxide trihydrate, aluminum sulfate decahydrate, aluminum fluoride trihydrate, aluminum nitrate nonhydrate and any eutectic blends of any of these materials or families of materials including salts with melting points below 550 degrees Celsius.

12. The flexible thermal control composite of claim 6, wherein said micronized endothermic agent is selected from the group consisting of micronized oxidized polymers, unoxidized polymers, oxidized homopolymers, unoxidized homopolymers of ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high



85 molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene  
homopolymers, unoxidized polyethylene homopolymers, carnauba wax, aluminum  
hydroxide, calcium hydroxide, potassium hydroxide, lithium hydroxide, boric acid,  
paraldehyde, paraformaldehyde, trioxane, lithium formate, lithium acetate, lithium  
carbonate, calcium carbonate, silicon carbonate, magnesium carbonate, sodium  
90 bicarbonate, salts of acetic acid, salts of formic acid, salts of boric acid, lithium  
chloride trihydrate, lithium nitrate trihydrate, sodium carbonate decahydrate,  
sodium borate decahydrate, hydrated epsom salts, magnesium nitrate hexahydrate,  
beryllium sulfate tetrahydrate, sodium phosphate dodecahydrate, calcium chloride  
hexahydrate, zinc sulfate heptahydrate, magnesium chloride hexahydrate, sodium  
95 sulfate decahydrate, aluminum oxide trihydrate, aluminum sulfate decahydrate,  
aluminum fluoride trihydrate, aluminum nitrate nonhydrate and any eutectic blends  
of any of these materials or families of materials including salts with melting points  
below 550 degrees Celsius.

100 13. The thermal control composite of claim 3, wherein said  
recyclable endothermic agent is selected from the group consisting of oxidized  
polymers, unoxidized polymers, oxidized homopolymers, unoxidized  
homopolymers of ethylene polymer compounds, carbon monoxide-bonded  
copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-  
bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high  
105 molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene  
homopolymers, unoxidized polyethylene homopolymers, carnauba wax, glycerin,  
glycol, and glycerin/glycol hydrated salts and any eutectic blends of any of these



materials or families of materials including salts with melting points below 550 degrees Celsius.

110

14. The thermal control composite of claim 4, wherein said recyclable endothermic agent is selected from the group consisting of oxidized polymers, unoxidized polymers, oxidized homopolymers, unoxidized homopolymers of ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene homopolymers, unoxidized polyethylene homopolymers, carnauba wax, glycerin, glycol, and glycerin/glycol hydrated salts and any eutectic blends of any of these materials or families of materials including salts with melting points below 550 degrees Celsius.

115  
120  
125  
130  
135  
140  
145  
150  
155  
160  
165  
170  
175  
180  
185  
190  
195  
200  
205  
210  
215  
220  
225  
230  
235  
240  
245  
250  
255  
260  
265  
270  
275  
280  
285  
290  
295  
300  
305  
310  
315  
320  
325  
330  
335  
340  
345  
350  
355  
360  
365  
370  
375  
380  
385  
390  
395  
400  
405  
410  
415  
420  
425  
430  
435  
440  
445  
450  
455  
460  
465  
470  
475  
480  
485  
490  
495  
500  
505  
510  
515  
520  
525  
530  
535  
540  
545  
550  
555  
560  
565  
570  
575  
580  
585  
590  
595  
600  
605  
610  
615  
620  
625  
630  
635  
640  
645  
650  
655  
660  
665  
670  
675  
680  
685  
690  
695  
700  
705  
710  
715  
720  
725  
730  
735  
740  
745  
750  
755  
760  
765  
770  
775  
780  
785  
790  
795  
800  
805  
810  
815  
820  
825  
830  
835  
840  
845  
850  
855  
860  
865  
870  
875  
880  
885  
890  
895  
900  
905  
910  
915  
920  
925  
930  
935  
940  
945  
950  
955  
960  
965  
970  
975  
980  
985  
990  
995

125

15. The thermal control composite of claim 7, wherein said recyclable, micronized, endothermic agent is selected from the group consisting of oxidized polymers, unoxidized polymers, oxidized homopolymers, unoxidized homopolymers of ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene homopolymers, unoxidized polyethylene homopolymers, carnauba wax, glycerin, glycol, and glycerin/glycol hydrated salts and any eutectic blends of any of these



130 materials or families of materials including salts with melting points below 550  
degrees Celsius.

135 16. The thermal control composite of claim 8, wherein said  
recyclable, micronized endothermic agent is selected from the group consisting of  
oxidized polymers, unoxidized polymers, oxidized homopolymers, unoxidized  
homopolymers of ethylene polymer compounds, carbon monoxide-bonded  
copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-  
bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high  
molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene  
homopolymers, unoxidized polyethylene homopolymers, carnauba wax, glycerin,  
140 glycol, and glycerin/glycol hydrated salts and any eutectic blends of any of these  
materials or families of materials including salts with melting points below 550  
degrees Celsius.

17. The thermal control composite of claim 3, wherein said  
recyclable endothermic agent is a phase change material.

145 18. The thermal control composite of claim 4, wherein said  
recyclable endothermic agent is a phase change material.

19. The thermal control composite of claim 7, wherein said  
recyclable, micronized, endothermic agent is a phase change material.



20. The thermal control composite of claim 8, wherein said  
recyclable, micronized endothermic agent is a phase change material.

21. The flexible thermal control composite of claim 1, wherein  
said polymer is selected from the group of polymers consisting of natural and  
synthetic polymers.

22. The flexible thermal control composite of claim 2, wherein  
said polymer is selected from the group of polymers consisting of natural and  
synthetic polymers.

23. The flexible thermal control composite of claim 3, wherein  
said polymer is selected from the group of polymers consisting of natural and  
synthetic polymers.

24. The flexible thermal control composite of claim 4, wherein  
said polymer is selected from the group of polymers consisting of natural and  
synthetic polymers.

25. The flexible thermal control composite of claim 5, wherein  
said polymer is selected from the group of polymers consisting of natural and  
synthetic polymers.

26. The flexible thermal control composite of claim 6, wherein said polymer is selected from the group of polymers consisting of natural and synthetic polymers.

27. The flexible thermal control composite of claim 7, wherein said polymer is selected from the group of polymers consisting of natural and synthetic polymers.

28. The flexible thermal control composite of claim 8, wherein said polymer is selected from the group of polymers consisting of natural and synthetic polymers.

29. The flexible thermal control composite of claim 9, wherein said polymer is selected from the group of polymers consisting of natural and synthetic polymers.

30. The flexible thermal control composite of claim 10, wherein said polymer is selected from the group of polymers consisting of natural and synthetic polymers.

31. The flexible thermal control composite of claim 11, wherein said polymer is selected from the group of polymers consisting of natural and synthetic polymers.



32. The flexible thermal control composite of claim 12, wherein  
said polymer is selected from the group of polymers consisting of natural and  
synthetic polymers.

33. The flexible thermal control composite of claim 13, wherein  
said polymer is selected from the group of polymers consisting of natural and  
synthetic polymers.

34. The flexible thermal control composite of claim 14, wherein  
said polymer is selected from the group of polymers consisting of natural and  
synthetic polymers.

35. The flexible thermal control composite of claim 15, wherein  
said polymer is selected from the group of polymers consisting of natural and  
synthetic polymers.

36. The flexible thermal control composite of claim 16, wherein  
said polymer is selected from the group of polymers consisting of natural and  
synthetic polymers.

37. The flexible thermal control composite of claim 17, wherein  
said polymer is selected from the group of polymers consisting of natural and  
synthetic polymers.



38. The flexible thermal control composite of claim 18, wherein said polymer is selected from the group of polymers consisting of natural and synthetic polymers.

205

39. The flexible thermal control composite of claim 19, wherein said polymer is selected from the group of polymers consisting of natural and synthetic polymers.

210

40. The flexible thermal control composite of claim 20, wherein said polymer is selected from the group of polymers consisting of natural and synthetic polymers.

215

41. The flexible thermal control composite of claim 1, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well known to those skilled in the art of thermoprotective materials and the mixtures thereof.

220





42. The flexible thermal control composite of claim 2, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well known to those skilled in the art of thermoprotective materials and the mixtures thereof.

43. The flexible thermal control composite of claim 3, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well known to those skilled in the art of thermoprotective materials and the mixtures thereof.

44. The flexible thermal control composite of claim 4, wherein said polymer is selected from the group of polymers consisting of latexes,



fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers  
polyimides, polyesters, high density polymers, polyamides, polyarylates,  
polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides,  
polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones,  
phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics,  
polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well  
known to those skilled in the art of thermoprotective materials and the mixtures  
thereof.

45. The flexible thermal control composite of claim 5, wherein  
said polymer is selected from the group of polymers consisting of latexes,  
fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers  
polyimides, polyesters, high density polymers, polyamides, polyarylates,  
polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides,  
polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones,  
phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics,  
polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well  
known to those skilled in the art of thermoprotective materials and the mixtures  
thereof.

46. The flexible thermal control composite of claim 6, wherein  
said polymer is selected from the group of polymers consisting of latexes,  
fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers  
polyimides, polyesters, high density polymers, polyamides, polyarylates,



265 polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides,  
polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones,  
phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics,  
polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well  
known to those skilled in the art of thermoprotective materials and the mixtures  
270 thereof.

47. The flexible thermal control composite of claim 7, wherein  
said polymer is selected from the group of polymers consisting of latexes,  
fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers  
polyimides, polyesters, high density polymers, polyamides, polyarylates,  
275 polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides,  
polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones,  
phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics,  
polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well  
known to those skilled in the art of thermoprotective materials and the mixtures  
280 thereof.

48. The flexible thermal control composite of claim 8, wherein  
said polymer is selected from the group of polymers consisting of latexes,  
fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers  
polyimides, polyesters, high density polymers, polyamides, polyarylates,  
285 polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides,  
polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones,



phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well known to those skilled in the art of thermoprotective materials and the mixtures thereof.

49. The flexible thermal control composite of claim 10, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well known to those skilled in the art of thermoprotective materials and the mixtures thereof.

50. The flexible thermal control composite of claim 11, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well



known to those skilled in the art of thermoprotective materials and the mixtures thereof.

51. The flexible thermal control composite of claim 12, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well known to those skilled in the art of thermoprotective materials and the mixtures thereof.

52. The flexible thermal control composite of claim 13, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well known to those skilled in the art of thermoprotective materials and the mixtures thereof.



53. The flexible thermal control composite of claim 14, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well known to those skilled in the art of thermoprotective materials and the mixtures thereof.

54. The flexible thermal control composite of claim 15, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well known to those skilled in the art of thermoprotective materials and the mixtures thereof.

55. The flexible thermal control composite of claim 16, wherein said polymer is selected from the group of polymers consisting of latexes,



fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers  
polyimides, polyesters, high density polymers, polyamides, polyarylates,  
polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides,  
polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones,  
phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics,  
polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well  
known to those skilled in the art of thermoprotective materials and the mixtures  
thereof.

56. The flexible thermal control composite of claim 17, wherein  
said polymer is selected from the group of polymers consisting of latexes,  
fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers  
polyimides, polyesters, high density polymers, polyamides, polyarylates,  
polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides,  
polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones,  
phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics,  
polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well  
known to those skilled in the art of thermoprotective materials and the mixtures  
thereof.

57. The flexible thermal control composite of claim 18, wherein  
said polymer is selected from the group of polymers consisting of latexes,  
fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers  
polyimides, polyesters, high density polymers, polyamides, polyarylates,



375 polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides,  
polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones,  
phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics,  
polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well  
known to those skilled in the art of thermoprotective materials and the mixtures  
380 thereof.

58. The flexible thermal control composite of claim 19, wherein  
said polymer is selected from the group of polymers consisting of latexes,  
fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers  
polyimides, polyesters, high density polymers, polyamides, polyarylates,  
385 polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides,  
polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones,  
phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics,  
polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well  
known to those skilled in the art of thermoprotective materials and the mixtures  
390 thereof.

59. The flexible thermal control composite of claim 20, wherein  
said polymer is selected from the group of polymers consisting of latexes,  
fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers  
polyimides, polyesters, high density polymers, polyamides, polyarylates,  
395 polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides,  
polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones,  
phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics,





polyurethanes, polyvinyls, polyvinylchlorides, polymeric, plastic materials well  
known to those skilled in the art of thermoprotective materials and the mixtures  
thereof.

400

00615507 071200



#### ABSTRACT OF THE DISCLOSURE

A flexible thermal control composite comprising a natural or synthetic polymer and an endotherm dispersed, distributed and suspended within said natural or synthetic polymer i.e. "P"olymer "C"ontaining an "E"ndothermic "A"gent (PCEA). The PCEA can be formed into thin and thick films. It can be drawn, molded, extruded and spun into fibers or all dimensions. It can be formed and chopped into PCEA mulch. Irrespective its final form, the PCEA can be used in insulating, thermoprotecting, heat absorbing applications on the one hand, and heat maintenance applications of all types on the other.

405

00515507 071300

bp (PATFORMS)

DECLARATION, POWER OF ATTORNEY AND PETITION

As a below named inventor, I hereby declare:

That my residence, post office address and citizenship are stated as below next to my name, that I declare that I am the inventor of the invention entitled: FLAMMABLE THERMAL CONTROL COMPOSITE, which is described and claimed in the attached specification and claims benefit from Provisional Application No. 60/143,722, filed July 14, 1999.

That I verily believe that I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the invention described and claimed therein; and say that I have reviewed and understand the contents of the specification thereof, including the claims and drawings as amended by any amendment specifically referred to herein, that I do not know and do not believe that the same was ever known or used in the United States or America before my invention thereof or patented or described in any printed publication in any country before my invention thereof, or more than one year prior to this application, or in public use or on sale in the United States of America more than one year prior to this application, that said invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or any legal representatives or assigns more than six/twelve months prior to this application, that I acknowledge my duty to disclose information on which I am aware which is material to the examination of this application in accordance with 37 C.F.R. 1.56(a), and that no application for patent or inventor's certificate on this invention has been filed by me or my legal representatives or assigns in any country foreign to the United States of America except as follows: NONE, for which priority under 35 U.S.C. 119 is claimed.

And that I hereby appoint MURRAY SCHAFER, Registration No. 18,671, PANAGIOTA BETTY TUPARIETIS, Registration No. 40,851 and PAUL J. HIGGINS, Registration No. 44,152, as my attorneys with full power of substitution, association and revocation, to sign the drawings, to prosecute this application and any and all foreign application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent Office in connection therewith. Please address all correspondence to:

BAUER & SCHAFER, LLP  
114 Old Country Road  
Mineola, New York 11501  
(516) 248-1050

Wherefore I pray, that Letters Patent be granted to me for the invention described and claimed in the foregoing specification and claim, and I hereby subscribe my name to the foregoing specification and claim, declaration, power of attorney and this petition.

The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

DATE: 7/12/2000

SIGNED: 

P.O. Address/  
and Residence:  
Citizenship:

Claude Q.C. Hayes  
3737 Third Avenue, #308  
San Diego, CA 92103  
USA

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner of Patents and Trademarks  
Box Patent Application  
Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the patent application of

Inventor: Claude Q.C. Hayes

For: FLEXIBLE THERMAL CONTROL COMPOSITE

The application comprises the following:

- ☒ Specification, Claims, and Abstract
- ☒ Declaration, Power of Attorney, and Petition
- ☒ Drawings (6 sheets)

## CLAIMS AS FILED

Base Fee	- - - - -			\$ 345.00
Total Claims	59-20 =	x \$9.00	=	351.00
Ind. Claims	01-03 =	x \$40.00	=	0
Multiple Dependencies (\$130.00)				0

TOTAL FEE \$696.00

☒ A Small Entity Statement is attached.

☒ Check No. 3066 in the amount of \$696.00 is enclosed to cover the filing and recordal fees. The Commissioner is hereby authorized to draw on the undersigned's Deposit Account No. 19-0265 if the amount paid is insufficient and if any additional fee is required during the pendency of this application. The Commissioner is also requested to deposit in said Deposit Account any amount which might prove to be in excess of the required fees.

Respectfully submitted,

*Panagiota Betty Tufariello*  
PANAGIOTA BETTY TUFARIELLO  
Registration No. 40,851  
Attorney for Applicant  
BAUER & SCHAFFER, LLP  
114 Old Country Road  
Mineola, NY 11501  
(516) 248-1050

Dated: July 13, 2000

Express Mail Label No. EL567401052US

Date of Deposit July 13, 2000

I hereby certify that this paper is being deposited with the U.S. Postal Service "Express Mail P.O. to Addressee" service under 37 C.F.R. 1.10 on the date indicated above and is addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Date: July 13, 2000

*Panagiota Betty Tufariello*  
Panagiota Betty Tufariello

10841 U.S. PTO  
09/615507

10781 U.S. PTO  
09/615507  
07/13/00

09615507-071300

Jul 13 00 09:28a

ve cingetorix

619 299-3449

P.2

87/13/2088 11:48 5167468054

BAUERSCHAFER

P 82

bp (smallest)

Docket: P-5534-27

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Claude Q.C. Hayes  
Serial No.:  
Filed: even date herewith  
For: FLEXIBLE THERMAL CONTROL COMPOSITE

Hon. Commissioner of Patents  
and Trademarks  
Washington, D.C. 20231

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS  
UNDER 37 C.F.R. 1.2(f) AND 1.27(b) -- INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 C.F.R. 1.9(c) for purposes of paying reduced fees under Sections 41(a) and 41(b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention described in the above-entitled application (Patent).

I have not assigned, granted, conveyed, or licensed and am under no obligation under contract or law to assign, grant, convey, or license any rights in the invention to any person who could not be classified as an independent inventor under 37 C.F.R. 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 C.F.R. 1.2(d) or a nonprofit organization under 37 C.F.R. 1.2(e).

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate (37 C.F.R. 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issuing thereon, or any patent to which this verified statement is directed.

Date:

7/12/2000

Claude Q.C. Hayes

P.5536-12  
1/6

FIG. 1

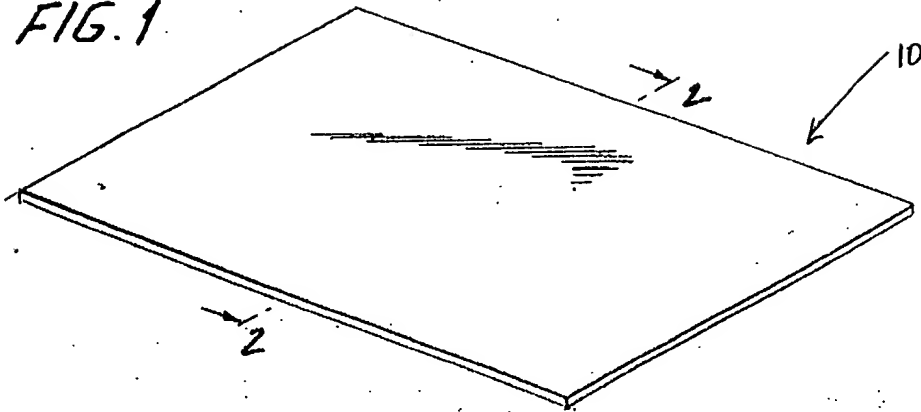


FIG. 2



FIG. 3

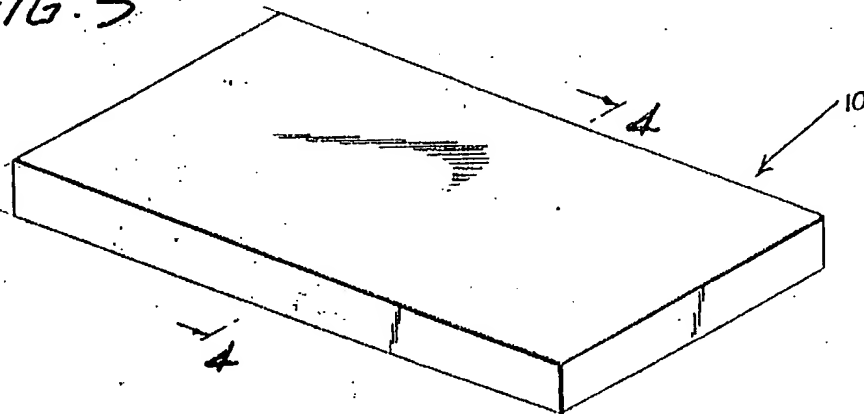
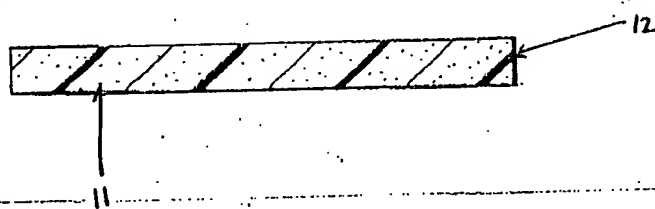


FIG. 4



09615507-071300

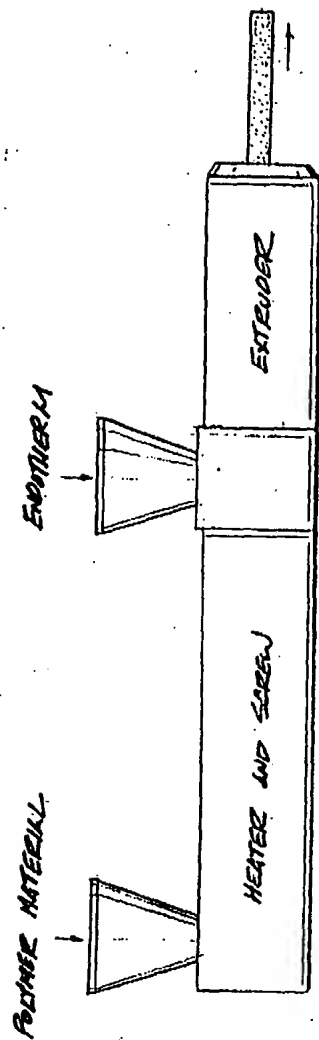


FIG. 5

FIG. 5  
12/16

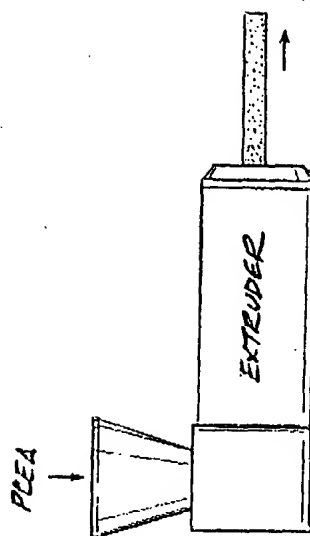


FIG. 6

P. 554.12  
3/6

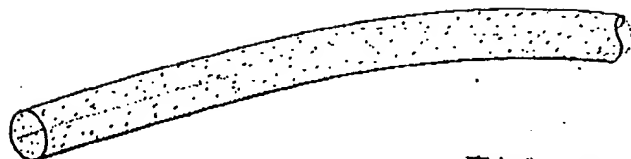


FIG. 7

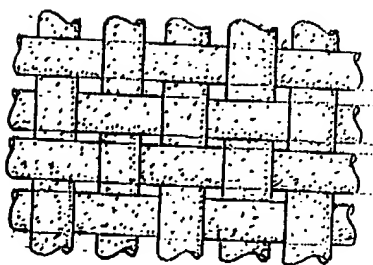


FIG. 8

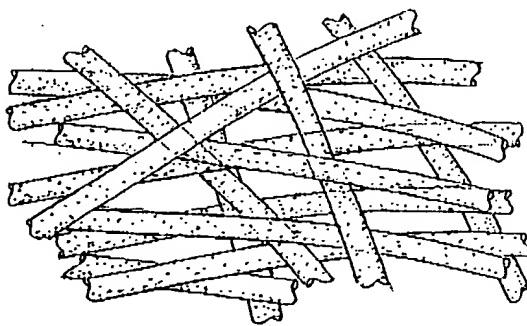


FIG. 9

09615507, 071300



P.5534-12  
4/6

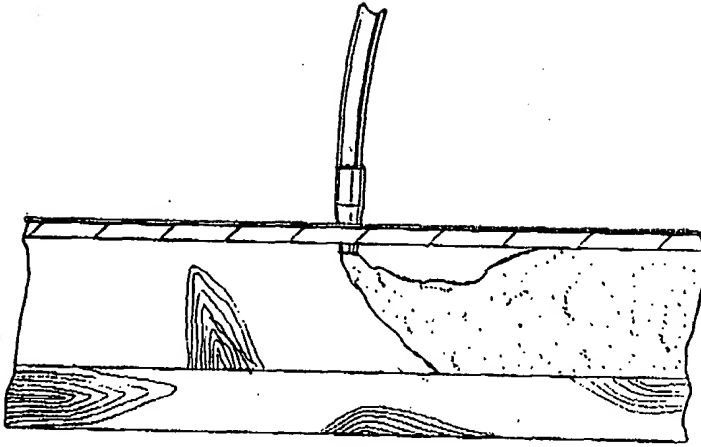


FIG. 12

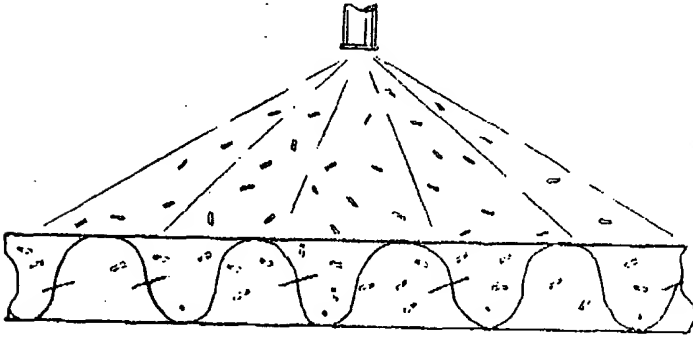


FIG. 11

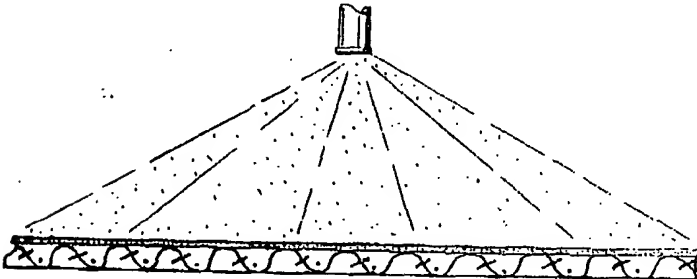


FIG. 10

00000000 00000 000000000

FIG. 13

P. 2535-12  
576

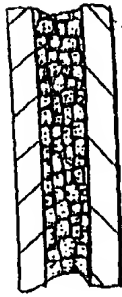
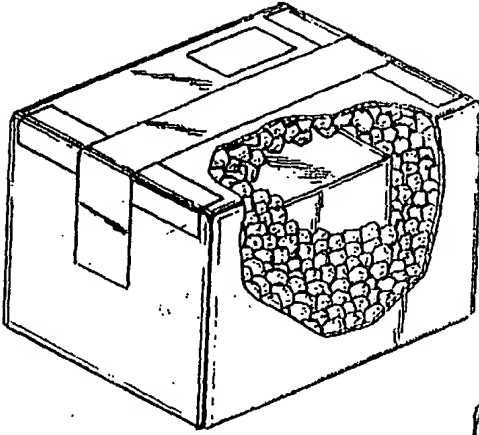


FIG. 15

FIG. 14

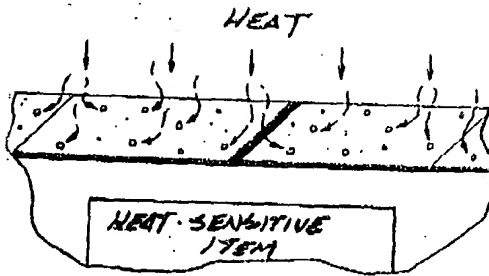
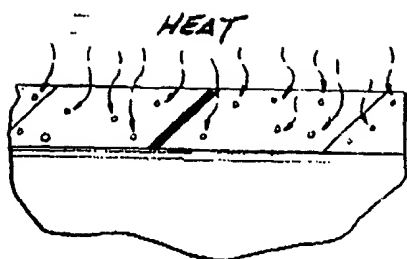


FIG. 16

09615507-071300

P:5534.12  
4/6



**FIG. 17a**

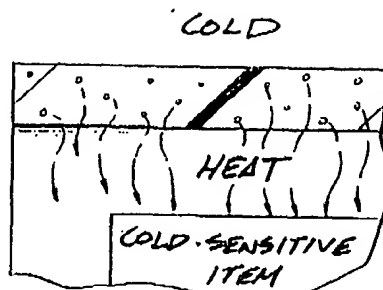


FIG. 176

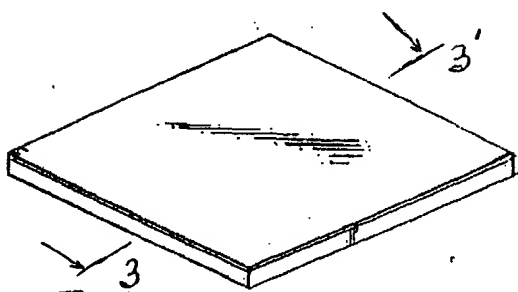


FIG. 12

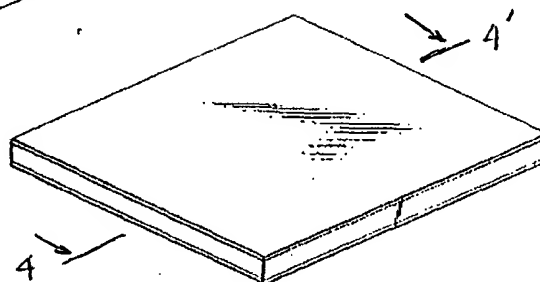


FIG. 19

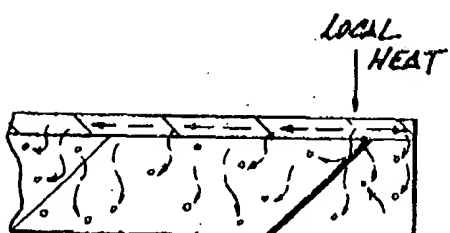


FIG. 20

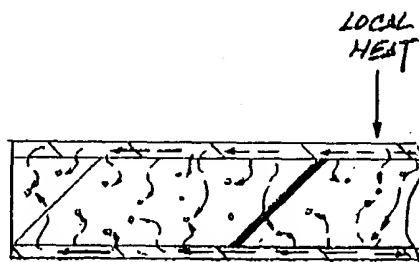


FIG. 21



P. 5534-12  
1/72

FIG. 1

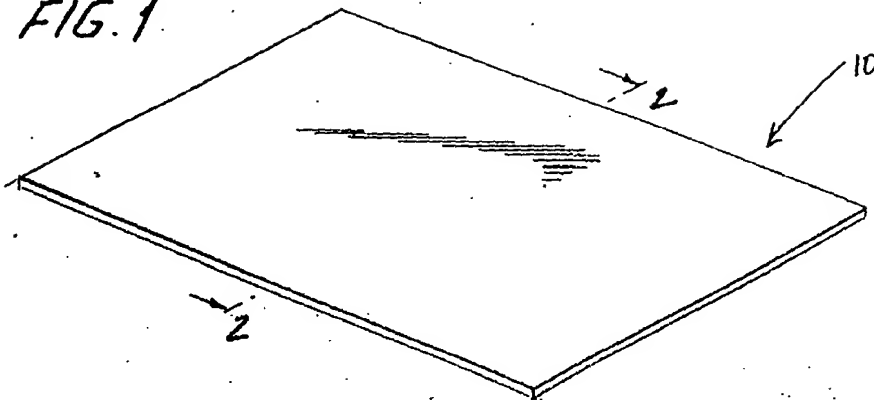


FIG. 2



FIG. 3

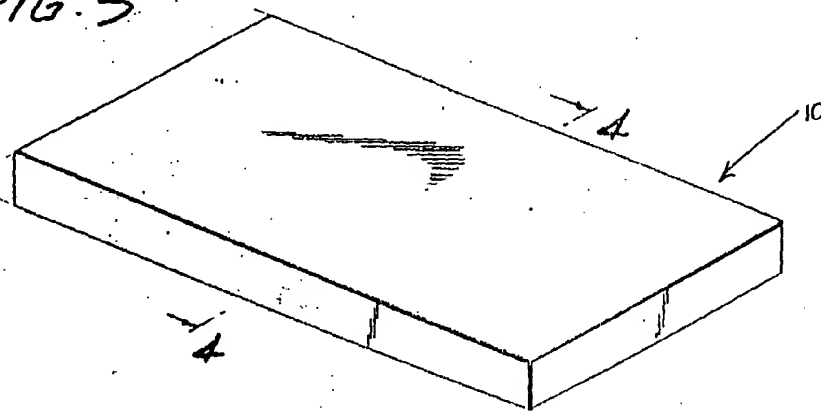


FIG. 4

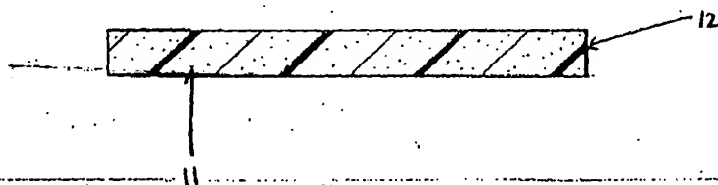




FIG. 5  
12/16

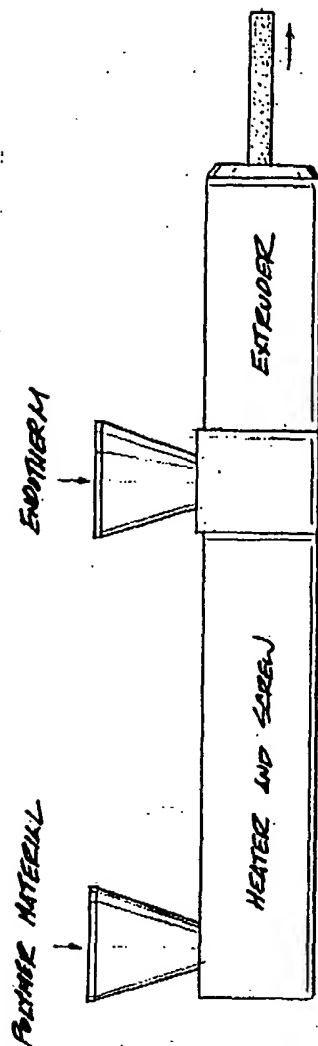


FIG. 5

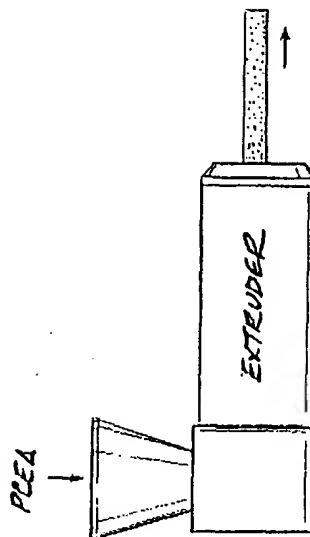


FIG. 6



P. 5534-12  
3/6

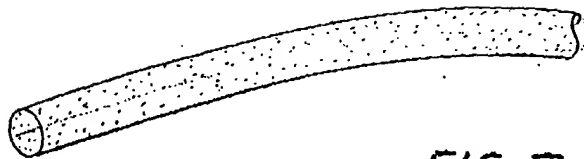


FIG. 7

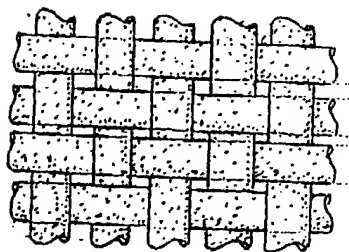


FIG. 8

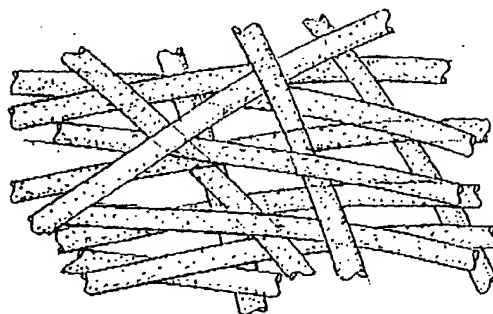
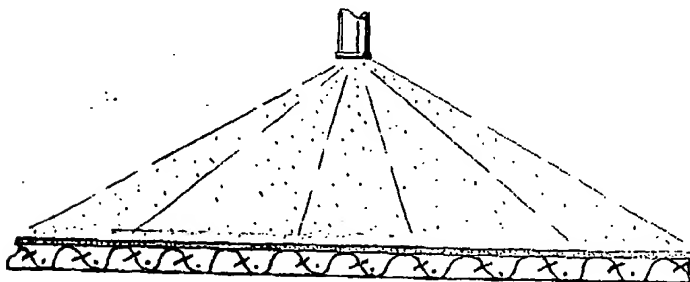
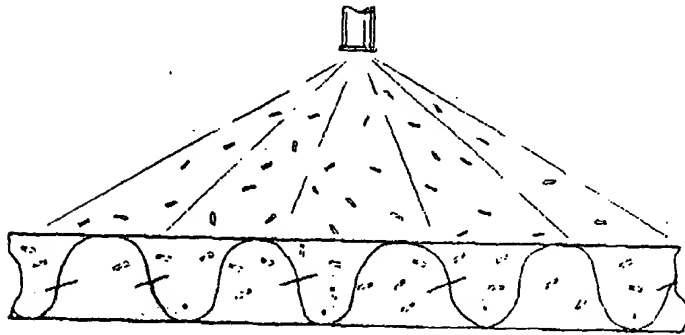
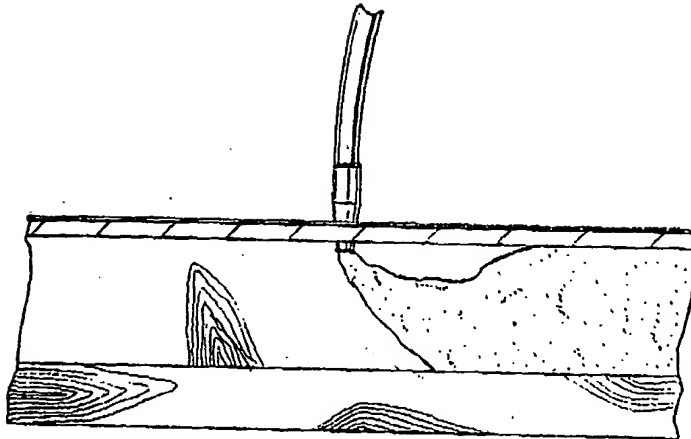


FIG. 9

2025 RELEASE UNDER E.O. 14176

P: 5534-12  
4/6



P. 2245-11  
5/6

FIG. 13

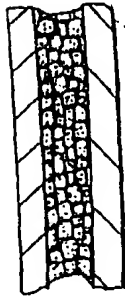
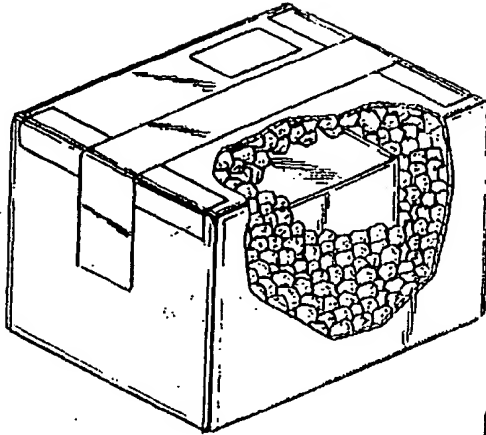


FIG. 15



FIG. 14

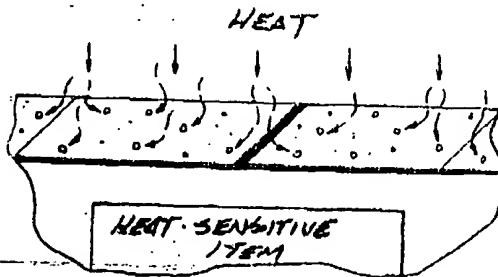


FIG. 16

00615507.071300





P. 5594.12  
6/6

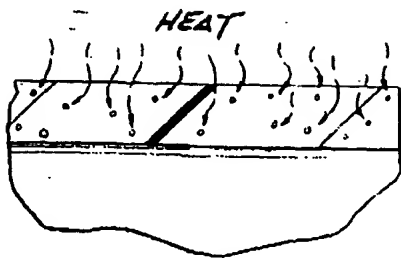


FIG. 17a

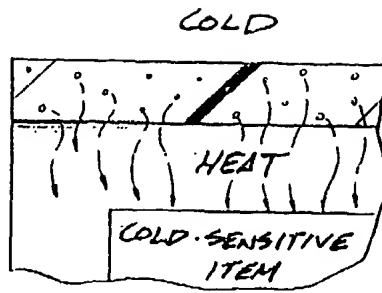


FIG. 17b

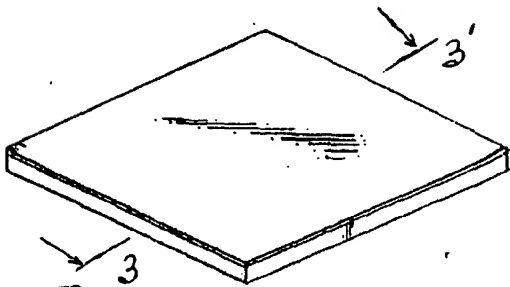


FIG. 18

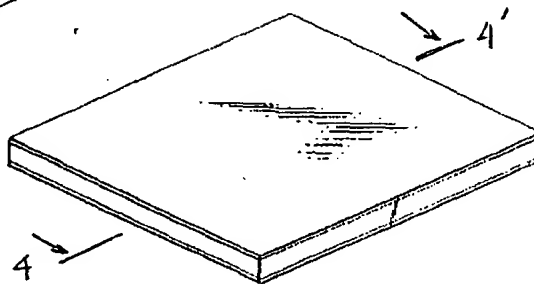


FIG. 19

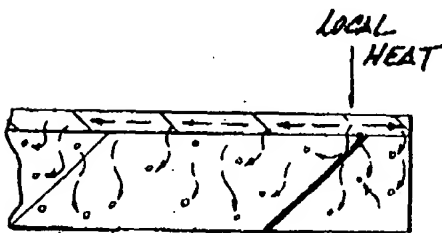


FIG. 20

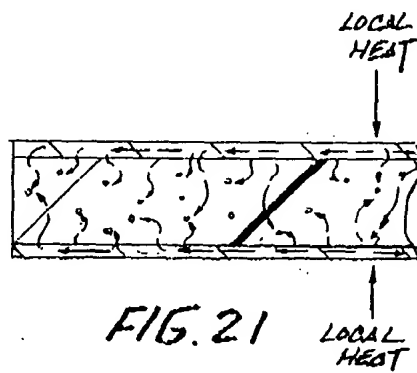


FIG. 21



UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231

NH

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
-----------------	-------------	----------------------	---------------------

09/615,507 07/13/00 HAYES

C P-5534-27

EXAMINER
----------

BAUER & SCHAFER LLP  
114 OLD COUNTRY ROAD  
MINEOLA NY 11501

IM52/0619

BAGWELL, M

ART UNIT	PAPER NUMBER
----------	--------------

1711

DATE MAILED:  
06/19/01

2

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks



<b>Office Action Summary</b>	<b>Application No.</b> 09/615,507	<b>Applicant(s)</b> HAYES, CLAUDE Q.C.	
	<b>Examiner</b> Melanie D. Bagwell	<b>Art Unit</b> 1711	

**– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) ☐ Responsive to communication(s) filed on \_\_\_\_\_.

2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) ☒ Claim(s) 1-59 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.

6) ☒ Claim(s) 1-59 is/are rejected.

7) ☒ Claim(s) 41-59 is/are objected to.

8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. § 119**

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some \* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

14) ☒ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

**Attachment(s)**

15) ☒ Notice of References Cited (PTO-892)

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_

18) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_

19) ☐ Notice of Informal Patent Application (PTO-152)

20) ☐ Other: \_\_\_\_\_



Application/Control Number: 09/615,507

Page 2

Art Unit: 1711

#### DETAILED ACTION

##### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 9-16, 29-36, and 41-59 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. Claims 9-16 list a series of endothermic agents, including "oxidized polymers, unoxidized polymers, oxidized homopolymers, unoxidized homopolymers of ethylene polymer compounds". It is unclear whether the applicant intends to claim oxidized polymers, unoxidized polymers, etc. of only polyethylene compounds or of any polymer.
4. The term "high molecular weight" in claims 9-16 is a relative term which renders the claim indefinite. The term "high molecular weight hydrocarbon" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. For the purposes of this Office action, it is the examiner's position to treat the term to encompass any hydrocarbon polymer.
5. Additionally, claims 9-16 recite the term "families of materials" in line 19 in line 2 from the bottom of the claims. One of ordinary skill in the art could not easily determine the bounds of the term "families of materials," thus rendering the claims indefinite.
6. The term "high density" in claims 41-59 is a relative term which renders the claim indefinite. The term "high density polymers" is not defined by the claim, the



Application/Control Number: 09/615,507  
Art Unit: 1711

Page 3

specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Furthermore, the claims recite "polymeric, plastic materials well known to those skilled in the art of thermoprotective materials". The specification does not clearly describe what plastic materials are well known to those skilled in the art, thus rendering the claims indefinite.

#### ***Claim Objections***

7. Claims 41-59 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The claims seem to encompass all polymeric materials by the inclusion of the term "polymeric, plastic materials well known to those skilled in the art of thermoprotective materials". Since the independent claim 1 is drawn to a composite comprising a polymer, a term including all polymeric materials would fail to further limit the polymer.

#### ***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.



9. Claims 1-59 are rejected under 35 U.S.C. 102(b) as being anticipated by Hayes.

Hayes (USPN 5,709,914) is cited in the specification, p. 2 lines 20-23.

10. Hayes discloses a flexible thermal composite comprising an endothermic phase change material embedded within a molding matrix, where preferred matrix materials include synthetic and natural polymers (column 2, lines 34-50; column 3, lines 17-26).

Hayes teaches several of the applicant's claimed endothermic materials, including micronized polyethylene waxes, noting also that the endothermic materials may be recycled (column 3, lines 1-7). Furthermore, Hayes teaches the use of perforated or powdered metals suspended in the matrices and also a KEVLAR/endothermic polyethylene composite sandwiched between two sheets of aluminum (column 4, lines 15-18; column 5, lines 34-45). In each of these situations, a thermal conductive material is contacting the thermal control composite.

11. Claims 1-4, 9-10, 13-14, 17-18, 21-24, 29-30, 33-34, 37-38, 41-44, 49, 52-53, and 56-57 are rejected under 35 U.S.C. 102(b) as being anticipated by Tzur.

12. Tzur discloses flexible thermal control composites comprising endothermic hydrated inorganic salt powder and a polymeric binder (example 6). Tzur teaches that some of the materials will undergo a phase change after the melting the inorganic material that could result in the separation of the hydrated salt into an anhydrous salt and its water of hydration (column 15, lines 61-65). The inorganic material undergoes a phase change during heating and cooling, thus indicating a phase change material. Since the unseparated, hydrated inorganic material could be reused, it is thought to be



recyclable. Examples teach the use of hydrated epsom salts and other claimed inorganic salts while also teaching natural and synthetic rubber binders. For example, neoprene latex polymers are included in several examples (Stage 1, column 9; examples). Tzur also teaches the need for folded metal mesh or woven ceramic cloth as a structural means for the composite, thus providing a thermally conductive material in contact with the composite (column 3, line 65-column 4, line 2; Figure 4).

13. Claims 1-59 are rejected under 35 U.S.C. 102(b) as being anticipated by Buckley.

14. Buckley discloses flexible thermal control composites containing endothermic phase change materials dispersed within a polymer matrix (col. 3 line 65-col. 4 line 1), where Buckley lists several possible polymer natural or synthetic matrix materials (col. 5 lines 21-32). Phase change materials mentioned in the reference include polyethylene glycol and phase change salts, suggesting the use of oxidized polyethylene homopolymers and inorganic salts (col. 13 lines 21-30). The composite may include a conductive material, or the composite may have an adjacent conductive material layer (col. 7 lines 38-55), thus providing contacting thermal conductive materials.

Furthermore, Buckley teaches the phase change materials as being regenerated to the original state, thus suggesting recyclable properties of the materials. Regarding the size of the phase change materials used, Buckley suggests incorporating the materials into microcapsules, indicating the phase change materials are sized to be incorporated into microcapsules. Thus, it is the examiner's position that one skilled in the art would clearly envision the use of micronized phase change materials in the invention.



Application/Control Number: 09/615,507  
Art Unit: 1711

Page 6

***Claim Rejections - 35 USC § 103***

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 5-8, 11-12, 15-16, 19-20, 25-28, 31-32, 35-36, 39-40, 45-48, 50-51, and 54-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tzur.

17. Tzur applies as above, failing to specify the particle sizes (i.e. "micronized") of the inorganic powders used in the invention. However, the term "powder" as used in the reference indicates very small particle diameter. It is the examiner's position that it would have been prima facie obvious to use the inorganic powder having any desired particle size to optimize the thermal properties of the composite.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melanie D. Bagwell whose telephone number is (703) 308-6539. The examiner can normally be reached on M-F 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (703) 308-2462. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.



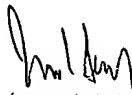
Application/Control Number: 09/615,507

Page 7

Art Unit: 1711

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 872-9309.

mdb  
June 15, 2001

  
James J. Callahan  
Supervisory Patent Examiner  
Technology Center 1711

**Notice of References Cited**Application/Control No.  
09/615,507Applicant(s)/Patent Under  
Reexamination  
HAYES, CLAUDE Q.C.Examiner  
Melanie D. BagwellArt Unit  
1711

Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification	
	A	US-4632865-A	12-1986	Tzur	428	304.4
	B	US-5722482-A	03-1998	Buckley	165	10
	C	US- -				
	D	US- -				
	E	US- -				
	F	US- -				
	G	US- -				
	H	US- -				
	I	US- -				
	J	US- -				
	K	US- -				
	L	US- -				
	M	US- -				

**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification	
	N	- -					
	O	- -					
	P	- -					
	Q	- -					
	R	- -					
	S	- -					
	T	- -					

**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



12-26-01

17/11/11

bp (PATAMEND)

Matter 36718

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

#3/Ext  
1/4/02  
D

Applicant: Claude Q.C. Hayes  
Serial No.: 09/615,507  
Filed: July 13, 2000  
Title: FLEXIBLE THERMAL CONTROL COMPOSITE

Hon. Commissioner of Patents  
and Trademarks  
Washington, D.C. 20231

**REQUEST FOR EXTENSION OF TERM UNDER 37 CFR 1.136(a)**

Sir:

This is in reply to the Official Action dated June 19, 2001.

A Petition for Extension of Term until December 19, 2001, to submit Applicant's response  
is hereby requested.

Enclosed is Applicant's check in the amount of \$460.00 to cover the official filing fee thereof.

The Commissioner is hereby authorized to draw on Deposit Account No. 501844 should any  
additional fees be required herein.

RECEIVED  
DEC 31 2001  
TC 1706



I hereby certify that this is being deposited with the United States Postal Service as Express Mail No. EL796425034US envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on December 19, 2001.

Dated: December 19, 2001

Panagiota Betty Tufariello  
Panagiota Betty Tufariello  
Reg. No.: 40,851  
Jaspan Schlesinger Hoffman LLP  
300 Garden City Plaza  
Garden City, New York 11530  
(516) 393-8249



OR (PATAMNDS)

Matter 36718

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Art Unit: 1711  
Applicant: Claude Hayes  
Serial No.: 09/615,507  
Filed: July 13, 2000  
Title: FLEXIBLE THERMAL CONTROL COMPOSITE

H4/A  
(N.E)  
Jarm  
1/4/02

Hon. Commissioner of Patents  
and Trademarks  
Washington, D.C. 20231

AMENDMENT

Dear Sir:

In response to the Office Action, dated June 19, 2001, kindly amend the above-identified application as follows:

In the Claims:

Please amend the claims as follows:

9. (Amended) The flexible thermal control composite of claim 1, wherein said endothermic agent is selected from the group consisting of oxidized polymers, unoxidized polymers, oxidized homopolymers of ethylene polymer compounds, unoxidized homopolymers

RECEIVED  
DEC 31 2001  
TC 1700

I hereby certify that this correspondence is being deposited with the United States Postal Service as Express Mail No. EL796425034US in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C., 20231 on December 19, 2001

DATED: December 19, 2001

Panagiota Betty Tufarillo

of ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene homopolymers, unoxidized polyethylene homopolymers, carnauba wax, aluminum hydroxide, calcium hydroxide, potassium hydroxide, lithium hydroxide, boric acid, paraldehyde, paraformaldehyde, trioxane, lithium formate, lithium acetate, lithium carbonate, calcium carbonate, silicon carbonate, magnesium carbonate, sodium bicarbonate, salts of acetic acid, salts of formic acid, salts of boric acid, lithium chloride trihydrate, lithium nitrate trihydrate, sodium carbonate decahydrate, sodium borate decahydrate, hydrated epsom salts, magnesium nitrate hexahydrate, beryllium sulfate tetrahydrate, sodium phosphate dodecahydrate, calcium chloride hexahydrate, zinc sulfate heptahydrate, magnesium chloride hexahydrate, sodium sulfate decahydrate, aluminum oxide trihydrate, aluminum sulfate decahydrate, aluminum fluoride trihydrate, aluminum nitrate nonhydrate and any eutectic blends of any of these materials [or families of materials] including salts with melting points below 550 degrees Celsius.

10. (Amended) The flexible thermal control composite of claim 2, wherein said endothermic agent is selected from the group consisting of oxidized polymers, unoxidized polymers, oxidized homopolymers of ethylene polymer compounds, unoxidized homopolymers of ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene homopolymers, unoxidized polyethylene homopolymers, carnauba wax, aluminum hydroxide, calcium hydroxide, potassium hydroxide, lithium hydroxide, boric acid, paraldehyde, paraformaldehyde, trioxane, lithium formate, lithium acetate, lithium carbonate, calcium carbonate, silicon carbonate, magnesium carbonate, sodium bicarbonate, salts of acetic acid, salts



of formic acid, salts of boric acid, lithium chloride trihydrate, lithium nitrate trihydrate, sodium carbonate decahydrate, sodium borate decahydrate, hydrated epsom salts, magnesium nitrate hexahydrate, beryllium sulfate tetrahydrate, sodium phosphate dodecahydrate, calcium chloride hexahydrate, zinc sulfate heptahydrate, magnesium chloride hexahydrate, sodium sulfate decahydrate, aluminum oxide trihydrate, aluminum sulfate decahydrate, aluminum fluoride trihydrate, aluminum nitrate nonhydrate and any eutectic blends of any of these materials [or families of materials] including salts with melting points below 550 degrees Celsius.

11.(Amended) The flexible thermal control composite of claim 5, wherein said micronized endothermic agent is selected from the group consisting of micronized oxidized polymers, unoxidized polymers, oxidized homopolymers of ethylene polymer compounds, unoxidized homopolymers of ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene homopolymers, unoxidized polyethylene homopolymers, carnauba wax, aluminum hydroxide, calcium hydroxide, potassium hydroxide, lithium hydroxide, boric acid, paraldehyde, paraformaldehyde, trioxane, lithium formate, lithium acetate, lithium carbonate, calcium carbonate, silicon carbonate, magnesium carbonate, sodium bicarbonate, salts of acetic acid, salts of formic acid, salts of boric acid, lithium chloride trihydrate, lithium nitrate trihydrate, sodium carbonate decahydrate, sodium borate decahydrate, hydrated epsom salts, magnesium nitrate hexahydrate, beryllium sulfate tetrahydrate, sodium phosphate dodecahydrate, calcium chloride hexahydrate, zinc sulfate heptahydrate, magnesium chloride hexahydrate, sodium sulfate decahydrate, aluminum oxide trihydrate, aluminum sulfate decahydrate, aluminum fluoride trihydrate, aluminum nitrate



nonhydrate and any eutectic blends of any of these materials [or families of materials] including salts with melting points below 550 degrees Celsius.

12. (Amended) The flexible thermal control composite of claim 6, wherein said micronized endothermic agent is selected from the group consisting of micronized oxidized polymers, unoxidized polymers, oxidized homopolymers of ethylene polymer compounds, unoxidized homopolymers of ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene homopolymers, unoxidized polyethylene homopolymers, carnauba wax, aluminum hydroxide, calcium hydroxide, potassium hydroxide, lithium hydroxide, boric acid, paraldehyde, paraformaldehyde, trioxane, lithium formate, lithium acetate, lithium carbonate, calcium carbonate, silicon carbonate, magnesium carbonate, sodium bicarbonate, salts of acetic acid, salts of formic acid, salts of boric acid, lithium chloride trihydrate, lithium nitrate trihydrate, sodium carbonate decahydrate, sodium borate decahydrate, hydrated epsom salts, magnesium nitrate hexahydrate, beryllium sulfate tetrahydrate, sodium phosphate dodecahydrate, calcium chloride hexahydrate, zinc sulfate heptahydrate, magnesium chloride hexahydrate, sodium sulfate decahydrate, aluminum oxide trihydrate, aluminum sulfate decahydrate, aluminum fluoride trihydrate, aluminum nitrate nonhydrate and any eutectic blends of any of these materials [or families of materials] including salts with melting points below 550 degrees Celsius.

13. (Amended) The thermal control composite of claim 3, wherein said recyclable endothermic agent is selected from the group consisting of oxidized polymers, unoxidized polymers, oxidized homopolymers of ethylene polymer compounds, unoxidized homopolymers





of ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene homopolymers, unoxidized polyethylene homopolymers, carnauba wax, glycerin, glycol, and glycerin/glycol hydrated salts and any eutectic blends of any of these materials [or families of materials] including salts with melting points below 550 degrees Celsius.

14. (Amended) The thermal control composite of claim 4, wherein said recyclable endothermic agent is selected from the group consisting of oxidized polymers, unoxidized polymers, oxidized homopolymers of ethylene polymer compounds, unoxidized homopolymers of ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene homopolymers, unoxidized polyethylene homopolymers, carnauba wax, glycerin, glycol, and glycerin/glycol hydrated salts and any eutectic blends of any of these materials [or families of materials] including salts with melting points below 550 degrees Celsius.

15. (Amended) The thermal control composite of claim 7, wherein said recyclable, micronized, endothermic agent is selected from the group consisting of oxidized polymers, unoxidized polymers, oxidized homopolymers of ethylene polymer compounds, unoxidized homopolymers of ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene homopolymers, unoxidized polyethylene homopolymers, carnauba wax, glycerin, glycol, and glycerin/glycol hydrated salts and any

eutectic blends of any of these materials [or families of materials] including salts with melting points below 550 degrees Celsius.

16. (Amended) The thermal control composite of claim 8, wherein said recyclable, micronized endothermic agent is selected from the group consisting of oxidized polymers, unoxidized polymers, oxidized homopolymers of ethylene polymer compounds, unoxidized homopolymers of ethylene polymer compounds, carbon monoxide-bonded copolymers, micronized polyethylene waxes, petroleum derived waxes, ethylene-bis-stearamide, N,N-ethylene-bis-stearamide, tars, high molecular weight oils, high molecular weight hydrocarbons, polyvinyl alcohols, oxidized polyethylene homopolymers, unoxidized polyethylene homopolymers, carnauba wax, glycerin, glycol, and glycerin/glycol hydrated salts and any eutectic blends of any of these materials [or families of materials] including salts with melting points below 550 degrees Celsius.

41. (Amended) The flexible thermal control composite of claim 1, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

42. (Amended) The flexible thermal control composite of claim 2, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded



fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

43. (Amended) The flexible thermal control composite of claim 3, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

44. (Amended) The flexible thermal control composite of claim 4, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.



45. (Amended) The flexible thermal control composite of claim 5, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

46. (Amended) The flexible thermal control composite of claim 6, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

47. (Amended) The flexible thermal control composite of claim 7, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes,



polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

48. (Amended) The flexible thermal control composite of claim 8, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

49. (Amended) The flexible thermal control composite of claim 10, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

50. (Amended) The flexible thermal control composite of claim 11, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene



sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

51. (Amended) The flexible thermal control composite of claim 12, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

52. (Amended) The flexible thermal control composite of claim 13, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

53. (Amended) The flexible thermal control composite of claim 14, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded

fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

54. (Amended) The flexible thermal control composite of claim 15, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

55. (Amended) The flexible thermal control composite of claim 16, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

56. (Amended) The flexible thermal control composite of claim 17, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

57. (Amended) The flexible thermal control composite of claim 18, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

58. (Amended) The flexible thermal control composite of claim 19, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes,





polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

59. (Amended) The flexible thermal control composite of claim 20, wherein said polymer is selected from the group of polymers consisting of latexes, fluoropolymers, expanded fluoropolymers, fluoroelastomers, elastomers polyimides, polyesters, high density polymers, polyamides, polyarylates, polyetherimides, polyketones, polyphenylene oxides, polyphenylene sulfides, polyphenylsulfones, polysulfones, acetals, nylons, ABS, polyetheretherketones, phenolics, polystyrenes, polycarbonates, polyethylenes, polypropylenes, acrylics, polyurethanes, polyvinyls, polyvinylchlorides, [polymeric, plastic materials well known to those skilled in the art of thermoprotective materials] and the mixtures thereof.

#### REMARKS

Reconsideration of this application as amended is requested.

Claims 1-59 are in this application. Claims 9-16 and claims 41-59 have been amended.

No new matter has been added.

I. Applicant traverses Examiner's rejection of claims 9-16, 29-36 and 41-59 under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 9-16 have been amended to clearly indicate Applicant's intention to claim "oxidized homopolymers of ethylene polymer compounds." In addition, Applicant annexes hereto excerpts of publicly available information which clearly show that even though the specification may not provide a definition for the term "high molecular weight" there is sufficient information in the public domain that one of ordinary skill in the art would in fact be reasonably

apprised of the scope of the invention. In fact, in the art of the invention, high molecular weight typically refers to polymer molecular weights of at least 1000. Very high molecular weight on the other hand, comprises molecular weights of at least one million, as for example TIVAR and SPECTRA.

Claims 29-36 have not been amended in any way, as Examiner did not provide any guidance as to how or why such claims have been rejected under 35 U.S.C. § 112 second paragraph. Accordingly, Applicant respectfully requests that Examiner withdraw such rejection or in the alternative provide a basis for such rejection and additional time to Applicant to respond accordingly.

Claims 41-59 have been amended to render them more definite in accordance with the Examiner's suggestions. In addition, as can be seen from Applicant's excerpts of publicly available information annexed hereto, even though the specification may not provide a specific definition for the term "high density" there is sufficient information both in the specification in the form of the various types of polymers listed and in the public domain that one of ordinary skill in the art would in fact be reasonably apprised of the scope of the invention.

II. Applicant traverses Examiner's Objection to claims 41-59 under 37 C.F.R. § 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant's amendment to claims 41-59 renders said Objection moot.

III. Applicant traverses Examiner's rejection of claims 1-59 under 35 U.S.C. § 102(b) as being anticipated by Hayes U.S. Patent No. 5,709,914.

Claim 1 is an independent claim. Claims 2-59 are all claims dependent on claim 1. Claim 1 recites that the inventive flexible thermal control composite comprises "an endothermic agent and a polymer, wherein said endothermic agent is distributed, dispersed and suspended within said polymer." (emphasis added)



Applicant's Specification specifically defines the terms "distributed, dispersed and suspended within said polymer" found in claim 1 with the following statement: " These polymers can be photo, thermally or chemically cured. More importantly however, they have a molecular structure consisting of long chains of mostly linear molecules, which after being relaxed by either controlled heating, dissolution or suspension in a plasticizer or solvent, provide the interstitial spaces, through which the endothermic or thermal storage compounds weave and are distributed prior to curing and the final formation of the PCEA." Specification, p. 7 l. 23- l. 28. In contrast, Hayes does not disclose any such feature.

Hayes discloses "a fibrous matrix core molded and formed to conform to an outer, supporting, rigid wall. Hayes, col. 2, l. 37- l. 40. Furthermore, Hayes discloses that the matrix "may be formed from fabric, cloth, metal mesh, batting fiberglass, fiber, dust particles, powder, carbon foam, silica foam, metal foam, hollow particles, KEVLAR . . . fiber, clay, aluminum, copper, perforated metal foils, cellulose materials and microspheres. Hayes col. 3, l. 17- l. 21. Finally Hayes discloses that the endotherm is attached to the matrix by adhesion, absorption, chemical bonding and the like. Hayes, col. 2, l. 38- l.40. Nowhere does Hayes disclose that "the endothermic agent is distributed, dispersed and suspended within said polymer." (emphasis added)

Accordingly, independent claim 1 and claims 2-59 dependent therefrom are neither taught nor disclosed by Hayes.

IV. Applicant traverses Examiner's rejection of claims 1-59 under 35 U.S.C. § 102(b) as being anticipated by Tzur U.S. Patent No. 4,632,865.

Claim 1 is an independent claim. Claims 2-59 are all claims dependent on claim 1. Claim 1 recites that the inventive flexible thermal control composite comprises "an endothermic agent and a polymer, wherein said endothermic agent is distributed, dispersed and suspended within said polymer." (emphasis added)



Applicant's Specification specifically defines the terms "distributed, dispersed and suspended within said polymer" found in claim 1 with the following statement: " These polymers can be photo, thermally or chemically cured. More importantly however, they have a molecular structure consisting of long chains of mostly linear molecules, which after being relaxed by either controlled heating, dissolution or suspension in a plasticizer or solvent, provide the interstitial spaces, through which the endothermic or thermal storage compounds weave and are distributed prior to curing and the final formation of the PCEA." Specification, p. 7 l. 23- l. 28. In contrast, Tzur does not disclose any such feature.

Tzur discloses the use of " multilayer intumescent-ablators for fire resistant purposes." Tzur, col. 1, l. 41- l. 43. Such heat and fire resistant protection is for a one time usage. Tzur, col. 5 l. 44-1.47. Tzur forms its multilayer intumescent ablators through "the incorporation of a strong ablator containing hydrated inorganic salts, combined with an intumescence agent." Tzur, col. 2, l. 39- 1.41. Tzur discloses that that ablator is formed using a conventional process of rubber production using a low density constituents such as cork combined with an inorganic salt. Tzur, col. 3, l. 24 - l. 46. Nowhere does Tzur disclose that "the endothermic agent is distributed, dispersed and suspended within said polymer." (emphasis added)

Accordingly, independent claim 1 and claims 2-59 dependent therefrom are neither taught nor disclosed by Tzur.

V. Applicant traverses Examiner's rejection of claims 1-59 under 35 U.S.C. § 102(b) as being anticipated by Buckley U.S. Patent No. 5,722,482.

Claim 1 is an independent claim. Claims 2-59 are all claims dependent on claim 1. Claim 1 recites that the inventive flexible thermal control composite comprises "an endothermic agent and a polymer, wherein said endothermic agent is distributed, dispersed and suspended within said polymer." (emphasis added)



Applicant's Specification specifically defines the terms "distributed, dispersed and suspended within said polymer" found in claim 1 with the following statement: " These polymers can be photo, thermally or chemically cured. More importantly however, they have a molecular structure consisting of long chains of mostly linear molecules, which after being relaxed by either controlled heating, dissolution or suspension in a plasticizer or solvent, provide the interstitial spaces, through which the endothermic or thermal storage compounds weave and are distributed prior to curing and the final formation of the PCEA." Specification, p. 7 l. 23- l. 28. In contrast, Buckley does not disclose any such feature.

Buckley discloses a phase change material incorporated into a flexible matrix material. Buckley, col. 3, l. 2-1.2. The flexible matrix material is preferably a flexible polymer or a polymer foam either open cell or closed cell. Buckley col. 3 l. 65- 1.67; col 4 l. 1. The phase change material may be physically added directly to the matrix material in the form of pellets or particles, as the flexible matrix material is being formed. Buckley col. 4, l. 11-13. Finally, the phase change material is either encapsulated or is retained onto fibers of polyacrylic or carboxymethyl cellulose before adding them to the matrix to prevent it from migrating or forming one solid inflexible mass as it cools. Buckley col. 4, l. 11 - l. 31. see also Buckley preparation processes col. 5-col. 6. Nowhere does Buckley disclose that "the endothermic agent is distributed, dispersed and suspended within said polymer." (emphasis added)

Accordingly, independent claim 1 and claims 2-59 dependent therefrom are neither taught nor disclosed by Buckley.

VI. Applicant traverses Examiner's rejection of claims 5-8, 11-12, 15-16, 19-20, 25-28, 31-32, 35-36, 39-40, 45-48, 50-51 and 54-55 under 35 U.S.C. § 103(a) as being unpatentable over Tzur.

Claim 1 is an independent claim. Claims 5-8, 11-12, 15-16, 19-20, 25-28, 31-32, 35-36, 39-40, 45-48, 50-51 and 54-55 are all claims either directly or indirectly dependent from

claim 1. This means that they incorporate by reference everything in claim 1 and add some further statements, limitations or restrictions. 37 C.F.R. 1.75(c).

Claim 1 recites that the inventive flexible thermal control composite comprises "an endothermic agent and a polymer, wherein said endothermic agent is distributed, dispersed and suspended within said polymer." (emphasis added) Examiner has not found claim 1 as being obvious in view of Tzur. Accordingly, all of the claims dependent therefrom are also not obvious in view of Tzur.

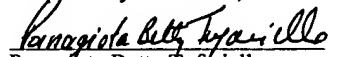
Allowance of claims 1-59 in their present form is thus believed appropriate.

No additional fee is due.

On the basis of the above amendments and remarks, reconsideration and allowance of the application is believed warranted.

Dated: 12/19/01

Respectfully Submitted,

  
Panagiotis Betty Tufariello  
Reg. No.: 40,851  
Jaspan Schlesinger Hoffman LLP  
300 Garden City Plaza  
Garden City, New York 11530  
(516) 393-8249

Oct 08 01 02:40p  
Oct-08-01 15:47

verdingetorix

2993449

p.2  
P.02

## A-C<sup>®</sup> Polyethylenes & Copolymers

### Typical Properties

	Melting Drop Point (ASTM D-3954)	Hardness, durometer (ASTM D-5)	Density, g/cc (ASTM D-1505)	Viscosity, cps @149°C (Brabender)	Acid Number, mg KOH/g (ASTM D-1386)	Physical Form
<b>Homopolymers</b>						
			<i>M<sub>w</sub>(GPC)</i> 5600			
AC 6, 6A	106 °C	223 °F	4.0	0.92	375	Nil
AC 7, 7A	109 °C	228 °F	2.5	0.92	450	Nil
AC 8, 8A	113 °C	235 °F	1.0	0.93	450	Nil
AC 9, 9A, 9F	115 °C	239 °F	0.5	0.93	450	Nil
AC 16, 16A	102 °C	216 °F	5.5	0.91	525	Nil
AC 617, 617A	101 °C	214 °F	7.0	0.91	180	Nil
AC 715	109 °C	228 °F	2.5	0.92	4000	Nil
AC 725	110 °C	230 °F	3.5	0.92	1400	Nil
AC 735	110 °C	230 °F	2.5	0.92	6000	Nil
AC 810A	121 °C	250 °F	1.0	0.95	20	Nil
AC 820A	126 °C	259 °F	<0.5	0.96	80	Nil
AC 1702	90 °C	194 °F	98.0 <sup>+</sup>	0.88	30	Nil
<b>Oxidized Homopolymers</b>						
AC 629, 629A	101 °C	214 °F	5.5	0.93	200	15
AC 655	107 °C	225 °F	2.5	0.93	210	16
AC 656	98 °C	208 °F	9.0	0.92	185	15
AC 673A, 673P	110 °C	230 °F	<1.0	0.95	400	17
AC 680	108 °C	226 °F	1.5	0.93	250	16
AC 6702	88 °C	190 °F	90.0 <sup>+</sup>	0.85	35	15
<b>High-Density Oxidized Homopolymers</b>						
AC 307, 307A	140 °C	284 °F	<0.5	0.98	85000 (@150°C)	7
AC 316, 316A	140 °C	284 °F	<0.5	0.98	8500 (@150°C)	16
AC 325	136 °C	277 °F	<0.5	0.99	4400 (@150°C)	25
AC 330	137 °C	279 °F	<0.5	0.99	3600 (@150°C)	30
AC 392	138 °C	280 °F	<0.5	0.99	4500 (@150°C)	30
AC 395, 395A	137 °C	279 °F	<0.5	1.00	2500 (@150°C)	41
<b>Copolymers/Ethylene-Acrylic Acid</b>						
AC 540, 540A	105 °C	221 °F	2.0	0.93	575	40
AC 580	95 °C	203 °F	4.0	0.94	650	75
AC 5120	92 °C	198 °F	8.0	0.94	650	120
<b>Copolymers/Ethylene-Vinyl Acetate</b>						
AC 400, 400A	92 °C	198 °F	9.5	0.92	595	13% Vinyl Acetate
AC 405(S)	94 °C	201 °F	7.0	0.92	600	11% Vinyl Acetate
AC 405(M)	100 °C	212 °F	5.0	0.92	600	8% Vinyl Acetate
AC 405(T)	102 °C	216 °F	4.0	0.92	600	6% Vinyl Acetate
<b>Oxidized Copolymer</b>						
AC 645P	100 °C	212 °F	3.0	0.94	Sol (Sop. No.)	13
	Melt. Point		Carbon Type	Acid Number, mg KOH/g (ASTM D-1386)	Viscosity, cps @ 150°C Brabender	Physical Form
<b>AlChyn® Low Molecular Weight Ionomers</b>						
AlChyn 201	102 °C	215 °F	Co	42	5,500	Granule, Powder
AlChyn 246	95 °C	203 °F	Mg	Nil	7,000	Granule, Powder
AlChyn 285	82 °C	180 °F	Na	20	80,000	Granule, Powder
AlChyn 295	99 °C	210 °F	Zn	Nil	4,500	Granule, Powder

Honeywell

Oct 08 01 02:40p

vercingetorix

2993449

P.3

Oct-08-01 16:47

P.03

Material Desc. (ASTM D-3954)	Hardness, durometer (ASTM D-15)	Density, g/cc (ASTM D-1545)	Viscosity cP @ 140°C (Brookfield)	Specific Heat J/kg K (Btu/lb °F)	Physical Form
<b>Modified Olefin Products</b>					
<b>Ethylene Maleic Anhydride Copolymers</b>					
AC 573A, 573P 106°C	223°F	0.92	600	5	Powder, Pastilles
AC X 575A, 575P 106°C	223°F	0.92	>1000	35	Powder, Pastilles
<b>Propylene Maleic Anhydride Copolymers</b>					
AC X 596A, 596P 143°C	290°F	0.94	<1000 @ 190°C	43	Powder, Pastilles
AC 597A, 597P 143°C	290°F	0.94	500 @ 190°C	80	Powder, Pastilles
AC 950P 153°C	307°F	0.93	2000 @ 190°C	43	Pastilles
AC X 1221P 150°C	302°F	0.93	800 @ 190°C	45	Pastilles
<b>Polypropylene Homopolymers</b>					
AC 108P 146°C	295°F	0.91	450 @ 190°C	Nil	Powder
AC 1172 150°C	302°F	0.91	1900 @ 190°C	Nil	Powder

**ACumist® Micronized Polyolefin Waxes**

Material Desc. (ASTM D-3954)	Hardness, durometer (ASTM D-15)	Density, g/cc (ASTM D-1545)	Avg. Particle Size microns	Add Number mg/kg (ppm) (ASTM D-1348-85)	Physical Form
<b>PE Micronized Waxes</b>					
ACumist A-6 137°C	279°F	<0.5	6	26-40	Micronized Powder
ACumist A-12 137°C	279°F	<0.5	12	26-40	Micronized Powder
ACumist A-18 137°C	279°F	<0.5	18	26-40	Micronized Powder
ACumist A-45 137°C	279°F	<0.5	45	26-40	Micronized Powder
ACumist B-6 126°C	259°F	<0.5	6	Nil	Micronized Powder
ACumist B-9 126°C	259°F	<0.5	9	Nil	Micronized Powder
ACumist B-12 126°C	259°F	<0.5	12	Nil	Micronized Powder
ACumist B-18 126°C	259°F	<0.5	18	Nil	Micronized Powder
ACumist C-3 121°C	250°F	1.0	5	Nil	Micronized Powder
ACumist C-12 121°C	250°F	1.0	12	Nil	Micronized Powder
ACumist C-18 121°C	250°F	1.0	18	Nil	Micronized Powder
ACumist D-5 118°C	244°F	1.5	5	Nil	Micronized Powder
ACumist D-9 118°C	244°F	1.5	9	Nil	Micronized Powder
ACumist E-6 113°C	235°F	1.0	6	Nil	Micronized Powder
ACumist E-12 113°C	235°F	1.0	12	Nil	Micronized Powder
<b>PTFE Micronized Wax Blends<sup>1</sup></b>					
ACumist J105 121°C	250°F	1.0	5	Nil	Micronized Powder
ACumist J205 121°C	250°F	<0.5	5	Nil	Micronized Powder
ACumist J305 121°C	250°F	<0.5	5	Nil	Micronized Powder
<b>PT Micronized Waxes</b>					
ACumist 1106 113°C	235°F	1.0	6	Nil	Micronized Powder
ACumist 1109 113°C	235°F	1.0	9	Nil	Micronized Powder
ACumist 1112 113°C	235°F	1.0	12	Nil	Micronized Powder
ACumist 1204 113°C	235°F	1.0	12	Nil	Micronized Powder
ACumist 1306 114°C	237°F	<0.5	4	Nil	Micronized Powder
ACumist 1309 114°C	237°F	<0.5	6	Nil	Micronized Powder

**Offices**

**Western Hemisphere**  
(U.S., Canada, Latin America)

Corporate Headquarters

Honeywell

Specialty Chemicals

P.O. Box 1053

101 Columbia Road

Morristown, New Jersey 07962-1053

Telephone: 973-455-2145

Toll Free in U.S.: 800-451-9961 (Technical Assistance)

800-222-0094 (Customer Service)

Fax: 973-455-2551 (Technical Assistance)

973-455-6154 (Customer Service)

**Europe/Mideast/Africa**  
Honeywell Europe N.V.  
Specialty Chemicals  
Hassrode Research Park  
Grauwmeer 1  
D-3001 Heerhooft, Belgium  
Telephone: 32-16-391-211  
Fax: 32-16-391-371  
Toll Free From:  
UK Only: 0-800-898-209

**Asia/Pacific**  
Honeywell Specialty Chemicals  
(Singapore) Pte Ltd.  
16A Science Park Drive  
03-01 The PASCAL  
Singapore 118228  
Telephone: 65-775-2133  
Fax: 65-775-2311

Visit us on the Web at [www.specialtychem.com](http://www.specialtychem.com)

**Notes**

Note 1: Buy Price listed is the initial unit price of the PT Wax only. PTFE does not melt but will decompose above 315°C.

Note 2: Determined by Differential Scanning Calorimetry.

Note 3: <0.5% dispersion in AC<sup>®</sup> product which is unpermeated or developed.

Note 4: Separation from the AC<sup>®</sup> by 0.5%.

Note 5: ASTM D-3321

NOTE: All customers, intermediaries, and data given herein are believed to be accurate and reliable, but are presented without warranty, express or implied. Customers or intermediaries using our products are solely without representation or warranty that any such use is free of patent infringement, and are not recommended to do so in any manner. The user should not assume that all safety measures are indicated, or that other measures may not be required.

AC, ACumist and ACQ are registered trademarks of Honeywell. ©2008 Honeywell

Printed in the U.S.A. (Rev. 4/05) Ed. / GEN 001



## Material Safety Data Sheet

### A-C Polyethylene Homopolymers

#### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME:** A-C 3A, 6, 6A, 6S, 7, 7A, 7AS, 8, 8A, 9, 9A, 9CP, 9F, 16, 16A, 617, 617A, 617G, 715, 725, 735, 1702.

**OTHER/GENERIC NAMES:** Polyethylene Homopolymers

**PRODUCT USE:** Multiple uses in many applications.

**MANUFACTURER:** Honeywell International  
Specialty Wax and Additives  
101 Columbia Rd., P.O. Box 1053  
Morristown, NJ 07962-1053

**FOR MORE INFORMATION CALL:**  
(Monday-Friday, 9:00am-4:30pm)  
973-455-4414

**IN CASE OF EMERGENCY CALL:**  
(24 Hours/Day, 7 Days/Week)  
800-424-9300 (CHEMTREC)  
973-455-2000

#### 2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS#	WEIGHT %
Polyethylene	9002-88-4	~ 100

Trace impurities and additional material names not listed above may also appear in the Regulatory Information section (#15) towards the end of the MSDS. These materials may be listed for local "Right to Know" compliance and for other reasons.

#### 3. HAZARDS IDENTIFICATION

**EMERGENCY OVERVIEW:** A-C 1702 is grease-like. All others are white waxy solids in pellet, prill, or powder form. Powdered material in air may form an explosive mixture. No other significant immediate health, physical, or environmental hazards are associated with these materials.

#### POTENTIAL HEALTH HAZARDS:

**SKIN:** Mild dermal irritant.

**EYES:** Non-eye irritant. Particulates may cause mechanical irritation.

**Honeywell**

## Material Safety Data Sheet

### A-C® Polyethylene Homopolymers

**INHALATION:** Treat powder as nuisance particulates.

**INGESTION:** No effects known. Low toxicity.

**DELAYED EFFECTS:** None known.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

Ingredient Name	NTP Status	IARC Status	OSHA List
* No ingredients listed in this section *			

#### 4. FIRST AID MEASURES

**SKIN:** Wash with water and soap.

**EYE:** Wash with water for 15 minutes. If irritation persists, consult physician.

**INHALATION:** For inhalation of powder, remove to fresh air.

**INGESTION:** Not expected to occur.

**ADVICE TO PHYSICIAN:** No specific advice. Treat according to symptoms present.

#### 5. FIRE FIGHTING MEASURES

##### FLAMMABLE PROPERTIES:

<b>FLASH POINT:</b>	> 445°F (> 230°C)
<b>FLASH POINT METHOD:</b>	Open cup.
<b>AUTOIGNITION TEMPERATURE:</b>	None known.
<b>UPPER FLAME LIMIT (Volume % in air):</b>	Not applicable.
<b>LOWER FLAME LIMIT (Volume % in air):</b>	Not applicable.
<b>FLAME PROPAGATION RATE (Solids):</b>	Unknown.
<b>OSHA FLAMMABILITY CLASS:</b>	Combustible solid.

##### EXTINGUISHING MEDIA:

Carbon dioxide, dry chemical or fine water spray. Avoid water stream on molten burning material as it may scatter and spread the fire.

**Honeywell**

## Material Safety Data Sheet

### A-C® Polyethylene Homopolymers

#### UNUSUAL FIRE AND EXPLOSION HAZARDS:

Fire point > 313°C. Melts in proximity to fires causing slippery floors and stairs. Static charges on powders or powders in liquids may ignite combustible atmospheres. See NFPA Bulletin 654, "Prevention of Fires and Dust Explosions in the Chemical, Dye, Pharmaceutical, and Plastics Industries" for safe handling procedures.

#### SPECIAL FIREFIGHTING PRECAUTIONS/INSTRUCTIONS:

Wear self-contained breathing apparatus approved by NIOSH. Watch footing on floors and stairs because of possible melting and spreading of material. Use water spray to keep containers cool.

### 6. ACCIDENTAL RELEASE MEASURES

**IN CASE OF SPILL OR OTHER RELEASES:** (Always wear recommended personal protective equipment.)  
Remove ignition sources from the powdered grades. Keep away from heat or flame. Swoop up with a minimum of dusting. Collect in container, e.g. fiberboard drum or carton.

Spills and releases may have to be reported to Federal and/or local authorities. See the Regulatory Information section (615) regarding reporting requirements.

### 7. HANDLING AND STORAGE

**NORMAL HANDLING:** (Always wear recommended personal protective equipment.)  
Avoid breathing fumes from heating operations. Avoid spillage which can cause very slippery conditions on floors. Use good personal hygiene and housekeeping.

**STORAGE RECOMMENDATIONS:**  
Avoid excessive heat. Do not store near strong oxidizing agents.

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**ENGINEERING CONTROLS:**  
Use adequate ventilation during heating processes, or if dusty conditions prevail when handling powdered materials. For storage and ordinary handling, general ventilation is adequate.

#### PERSONAL PROTECTIVE EQUIPMENT

**SKIN PROTECTION:**  
Protective garments, i.e. gloves with long sleeves, when handling molten material.

## Material Safety Data Sheet

### A-C<sup>®</sup> Polyethylene Homopolymers

#### EYE PROTECTION:

Chemical goggles around molten material and in dusty conditions.

#### RESPIRATORY PROTECTION:

Use a NIOSH approved dust respirator with powdered grades if dusty conditions prevail.  
During melting or conveying in molten state, use an organic vapor respirator.

#### ADDITIONAL RECOMMENDATIONS:

Not generally required.

#### EXPOSURE GUIDELINES:

(Guidelines exist for the following ingredients)

#### Ingredient Name

ACGIH TLV

OSHA PEL

Other Limit

\* No ingredients listed in this section \*

\* = Limit established by Honeywell International

\*\* = Workplace Environmental Exposure Level (AIHA)

\*\*\* = Biological Exposure Index

Other exposure limits for the decomposition products normally associated with product use are as follows:

Powdered forms may generate nuisance particulates upon handling: ACGIH TLV = 10 mg/m<sup>3</sup> of total particulates.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	A-C 1702 is grease-like; other grades are white pellets, prills, or powder.
PHYSICAL STATE:	Solid.
ODOR:	Characteristic waxy odor.
SPECIFIC GRAVITY:	(Water = 1.0) 0.88 - 0.97
SOLUBILITY IN WATER:	(Weight %) Negligible
pH:	Not applicable.
BOILING POINT:	Not applicable.
MELTING POINT:	92 - 122°C (198 - 252°F)
VAPOR PRESSURE:	Not applicable.
VAPOR DENSITY:	(Air = 1.0) Not applicable.
EVAPORATION RATE:	Not applicable. Compared to: Not applicable.
% VOLATILES:	Not applicable.
FLASH POINT:	> 445° (> 230°C)

(Flash point method and additional flammability data are found in Section 5.)

## Material Safety Data Sheet

### A-C<sup>®</sup> Polyethylene Homopolymers

#### 10. STABILITY AND REACTIVITY

**NORMALLY STABLE?** (Conditions to Avoid)  
Stable at normal conditions.

**INCOMPATIBILITIES:**  
Strong oxidizing agents.

**HAZARDOUS DECOMPOSITION PRODUCTS:**  
Depending on conditions of fire, CO, CO<sub>2</sub>, and combustible gases may be generated.

**HAZARDOUS POLYMERIZATION?**  
Will not occur.

#### 11. TOXICOLOGICAL INFORMATION

**IMMEDIATE (ACUTE) EFFECTS:**  
Acute oral toxicity in rats: LD<sub>50</sub> > 2000 mg/kg.

**DELAYED (SUBCHRONIC & CHRONIC) EFFECTS:**  
Not determined.

**OTHER DATA:**  
No other data developed.

#### 12. ECOLOGICAL INFORMATION

No data have been developed on this subject. These polymeric products are not soluble in water. They are not considered biodegradable.

#### 13. DISPOSAL CONSIDERATIONS

**RCRA:**  
Is the unused product a RCRA hazardous waste if discarded? No.  
If yes, the RCRA ID number is:

Oct 08 01 02:41p vercingetorix  
OCT-08-2001 15:51 HONEYWELL

2993449

3124000171 11/01/01 P.9  
**honeywell**

## Material Safety Data Sheet

### A-C<sup>®</sup> Polyethylene Homopolymers

**OTHER DISPOSAL CONSIDERATIONS:** Discard as non-hazardous organic solid waste.

The information offered here is for the product as shipped. Use and/or alteration to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

#### 14. TRANSPORT INFORMATION

**US DOT HAZARD CLASS:** Not regulated.

**US DOT ID NUMBER:** Not applicable.

For additional information on shipping regulations affecting this material, contact the information number found on the first page.

#### 15. REGULATORY INFORMATION

##### TOXIC SUBSTANCES CONTROL ACT (TSCA):

**TSCA INVENTORY STATUS:** Products are listed on the TSCA Chemical Inventory.

**OTHER TSCA ISSUES:** None.

##### SARA TITLE III/CERCLA:

###### **RQs & TPQs**

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

Ingredient	SARA/CERCLA RQ (lbs)	SARA EHS TPQ (lbs)
* No ingredients listed in this section *		

Spills/releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center (1-800-424-8802) and to your Local Emergency Planning Committee.

**SECTION 311 HAZARD CLASS:** None

##### **SARA 313 TOXIC CHEMICALS:**

The following ingredients are SARA 313 "Toxic Chemicals". CAS #s and wt. % are found in section #2.

Ingredient	Comment
* No ingredients listed in this section *	

Oct 08 01 02:41p versingetorix  
OCT-08-2001 15:51 HONEYWELL

2993449 9/34000104 P.01/01 P.10  
**honeywell**

## Material Safety Data Sheet

### A-C® Polyethylene Homopolymers

#### STATE RIGHT TO KNOW:

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes:

Ingredient	Wt. %	Comment
* No ingredients listed in this section *		

#### ADDITIONAL REGULATORY INFORMATION:

See Allied Technical Data Bulletin GEN-002 for FDA related information.

#### WHMIS CLASSIFICATION (CANADA):

Not subject to WHMIS regulations.

#### FOREIGN INVENTORY STATUS:

- Canadian DSL (Domestic Substances List)
- ENECS (European Inventory of Existing Commercial Chemical Substances)
- Australian Chemical Inventory
- Japanese Chemical Inventory (JENCS)
- Korean Inventory
- Philippine Inventory (PICCS)
- Chinese Inventory (draft)

#### 16. OTHER INFORMATION

CURRENT ISSUE DATE: 2/01  
PREVIOUS ISSUE DATE: 2/00

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:  
Removed A-C 810A and 820A, and put on separate MSDS.

OTHER INFORMATION: None



## POLYETHYLENE HOMOPOLYMERS

PRODUCT SAFETY  
DATA SHEET

## A. GENERAL INFORMATION

TRADE NAME (COMMON NAME) A-C® 3A, 6, 8A, 7, 7A, 8, 8A, 9, 9A, 9F, 15, 16, 20, 617, 617A, 617G, 712, 715, 725, 735 and 1702 Polyethylene		<input checked="" type="checkbox"/> C.A.S. NO. <input type="checkbox"/> ALLIED PRODUCT CODE # 9002-88-4	
CHEMICAL NAME AND/OR SYNONYM Polyethylene <i>#6 grade 830</i>			
FORMULA (C <sub>2</sub> H <sub>4</sub> ) <sub>n</sub> <i>delta 250 (350) decylen</i>		MOLECULAR WEIGHT Polymeric > 1100	
Allied-Signal Inc. A-C Performance Additives P.O. Box 2332R Morristown, N.J. 07962-2332 ADDRESS (No., STREET, CITY, STATE AND ZIP CODE)			
CONTACT Product Safety	PHONE NUMBER (201) 455-4414	LAST ISSUE DATE August, 1989	CURRENT ISSUE DATE March, 1990

## B. FIRST AID MEASURES

EMERGENCY PHONE NUMBER (201) 455-2000
INHALATION: (of powder) - Remove to fresh air. EYES: Eye contact mechanical irritation: Wash with water 15 minutes. If irritation persists, consult physician.

## C. HAZARDS INFORMATION

HEALTH	
INHALATION Treat powdered grades as nuisance particulates. Avoid breathing fumes from molten material.	
INGESTION No effects known. Acute oral toxicity in rats: LD <sub>50</sub> > 2000 mg/kg.	
SKIN Mild dermal irritant.	
EYES Non-eye irritant. Dust may cause mechanical irritation.	
PERMISSIBLE CONCENTRATION: AIR (SEE SECTION 3) Powdered grades: recommend using the 1988-89 value established for nuisance particulates (10 mg/m <sup>3</sup> of total particulate).	BIOLOGICAL None established
UNUSUAL CHRONIC TOXICITY No known hazards associated with the customary industrial use of these products.	



Oct 08 01 02:41p

vercingetorix

2993449

p.12

**G. HAZARDS (Cont.)****FIRE AND EXPLOSION**

FLASH POINT	> 231 °C	AUTO IGNITION TEMPERATURE	None known	FLAMMABLE LIMITS IN AIR (% BY VOL.)	LOWER - NA	UPPER - NA
<input checked="" type="checkbox"/> OPEN CUP <input type="checkbox"/> CLOSED CUP						
UNUSUAL FIRE AND EXPLOSION HAZARDS						
Fire point > 313°C. Melts in proximity to fires causing slippery floors and stairs. Static charges on powders or powders in liquids may ignite flammable atmospheres. Refer to Bulletin 654 for safe handling procedures (see Section J).						

**D. PRECAUTIONS/PROCEDURES**

FIRE EXTINGUISHING AGENTS - RECOMMENDED
Carbon dioxide, dry chemical or fine water spray.
FIRE EXTINGUISHING AGENTS TO AVOID
Water stream on molten burning material may scatter and spread fire.
SPECIAL FIRE FIGHTING PRECAUTIONS
Wear self-contained breathing apparatus approved by NIOSH. Watch footing on floors and stairs because of possible melting and spreading. Use spray to keep containers cool.
VENTILATION
Use adequate ventilation during heating processes or if dusty conditions prevail when handling powders. For storage and ordinary handling, general ventilation is adequate.
NORMAL HANDLING
Avoid breathing fumes from heating operations. Very slippery on floors, avoid spillage. Use good personal hygiene and housekeeping.
STORAGE
Avoid excessive heat.
SPILL OR LEAK (ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT - SECTION E)
Remove ignition sources from the powdered grades. Keep away from heat or flame. Sweep up with a minimum of dusting. Collect in container, e.g., fiberboard drum or carton.
SPECIAL PRECAUTIONS/PROCEDURES/LABEL INSTRUCTIONS
None
SIGNAL WORD -
NA

**E. PERSONAL PROTECTIVE EQUIPMENT**

RESPIRATORY PROTECTION
Use a NIOSH approved dust respirator for powdered grades when dusty conditions prevail. During melting or conveying in molten state use an organic vapor respirator.
EYES AND FACE
Chemical goggles around molten material and in dusty conditions.
HANDS, ARMS, AND BODY
Protective garments around molten material.
OTHER CLOTHING AND EQUIPMENT
Protective garments around molten material.

Oct 08 01 02:42p

vercingetorix

2993449

p. 13

**F. PHYSICAL DATA**

MATERIAL IS (AT NORMAL CONDITIONS): <input type="checkbox"/> LIQUID <input checked="" type="checkbox"/> SOLID <input type="checkbox"/> GAS <input type="checkbox"/>		APPEARANCE AND ODOR A-C* 1702 grease-like. All others white, waxy solid in pellets, prills or powder. Characteristic waxy odor.	
BOILING POINT	NA °C	SPECIFIC GRAVITY (H <sub>2</sub> O = 1)	VAPOR DENSITY (AIR = 1)
MELTING POINT	(Soft. Pt.) 92-117 °C	Solid 0.88 - 0.94	NA
SOLUBILITY IN WATER (% by Weight)	Negligible	pH NA	VAPOR PRESSURE (mm Hg at 20°C) <input type="checkbox"/> (PSIG) <input type="checkbox"/> Negligible @ ambient
EVAPORATION RATE (Butyl Acetate = 1) <input type="checkbox"/> (Ether = 1) <input type="checkbox"/>	NA	% VOLATILES BY VOLUME (At 20°C)	NA

**G. REACTIVITY DATA**

STABILITY <input type="checkbox"/> UNSTABLE <input checked="" type="checkbox"/> STABLE	CONDITIONS TO AVOID Excessive heat, A-C 1702 starts breaking down at temperatures over 100 °C; other products are more stable. Avoid direct contact with open flame.
INCOMPATIBILITY (MATERIALS TO AVOID) Strong oxidizing agents, although comparatively stable as are other polyethylenes.	
HAZARDOUS DECOMPOSITION PRODUCTS Depends on condition of fire, CO, CO <sub>2</sub> and combustible gases may be generated.	
HAZARDOUS POLYMERIZATION <input type="checkbox"/> MAY OCCUR <input checked="" type="checkbox"/> WILL NOT OCCUR	CONDITIONS TO AVOID None

**H. HAZARDOUS INGREDIENTS (Mixtures Only)**

MATERIAL OR COMPONENT / C.A.S. #	ppm	HAZARD DATA (SEE SECT. J)
NA  mp 197.6°F — 242°F	NA	NA

Oct 08 01 02:42p

vercingetorix

2993449

P. 14

DEGRADABILITY/AQUATIC TOXICITY		OCTA WATER PARTITION COEFFICIENT NA (Insoluble in Water)	
Not considered biodegradable or toxic.			
EPA HAZARDOUS SUBSTANCES (CLEAN WATER ACT SEC. 311)		IF SO REPORTABLE QUANTITY: _____	40 CFR 116-117
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			
WASTE DISPOSAL METHODS (DISPOSER MUST COMPLY WITH FEDERAL, STATE AND LOCAL DISPOSAL OR DISCHARGE LAWS)			
Discard as non-hazardous organic solid waste.			
RCRA STATUS OF UNUSED MATERIAL IF DISCARDED		HAZARDOUS WASTE NUMBER: (IF APPLICABLE)	40 CFR 261.22
Non-hazardous			

**J. REFERENCES**

PERMISSIBLE CONCENTRATION REFERENCES	
TLV: ACGIH List, 1988-89.	
REGULATORY STANDARDS	D.O.T. CLASSIFICATION: Not Regulated
Some states regulate the discharge of polyethylene polymers to streams. FDA: Allied Technical Data Bulletin GEN-002.	
49 CFR 173	
GENERAL	
National Fire Protection Association Bulletin ANSI/NFPA 654 "Prevention of Fire and Dust Explosions in the Chemical, Dye, Pharmaceutical, and Plastics Industries", 1988 Edition	

**K. ADDITIONAL INFORMATION**

Fire: Allied Technical Data Bulletin: Cleveland Open Cup Flash & Fire Points. (ASTM D92-72)	
Typical Properties: Allied Technical Data Bulletin (GEN-001).	
- These products are included in the TSCA Chemical Substance Inventory.	
- HMIS Code:	
Health	0
Flammability	1
Reactivity	0
- Under the criteria established for hazardous chemicals in the OSHA Hazardous Communication Act and SARA Title III, these materials are considered non-hazardous. They do not contain Extremely Hazardous Substances (Section 302) or Toxic Chemicals (Section 313).	

MSPE 7

THIS PRODUCT SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION.

ALLIED-SIGNAL INC. PROVIDES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE DATA CONTAINED HEREIN.

**Honeywell****Material Safety Data Sheet****A-C® Oxidized Polyethylene Homopolymers****1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

**PRODUCT NAME:** A-C® 307, 307A, 316, 316A, 325, 330, 392, 395, 395A, 629, 629A, 629P, 655, 656, 659, 660, 673A, 673P, 680, 680A, 6702

**OTHER/GENERIC NAMES:** Oxidized Polyethylene Homopolymers

**PRODUCT USE:** Multiple uses in many applications.

**MANUFACTURER:** Honeywell International  
Specialty Wax and Additives  
101 Columbia Rd., P.O. Box 1053  
Morristown, NJ 07962-1053

**FOR MORE INFORMATION CALL:**  
(Monday-Friday, 9:00am-4:30pm)  
973-455-4414

**IN CASE OF EMERGENCY CALL:**  
(24 Hours/Day, 7 Days/Week)  
800-424-9300 (CHEMTREC)  
973-455-2000

**2. COMPOSITION/INFORMATION ON INGREDIENTS**

<b>INGREDIENT NAME</b>	<b>CAS #</b>	<b>WEIGHT %</b>
Oxidized Polyethylene	68441-17-8	- 100

Trace impurities and additional material names not listed above may also appear in the Regulatory Information section (#15) towards the end of the MSDS. These materials may be listed for local "Right to Know" compliance and for other reasons.

**3. HAZARDS IDENTIFICATION**

**EMERGENCY OVERVIEW:** A-C 6702 is grease-like. All other products are white waxy solids in pellet, prill, or powder form. Powdered material in air may form an explosive mixture. No other significant immediate health, physical, or environmental hazards are associated with these materials.

**POTENTIAL HEALTH HAZARDS:**

**SKIN:** Negligible dermal irritant.



P.O. Box 1039  
Morristown, NJ 07962-1039

**A-C Polyethylene****316A**

Specification No.: 303161227

Date: 11/93

**Material Specifications**

Item	Allied Test Method	Specifications
Acid Number	TMP-QCL-006	15-18 mg KOH/g
Particle Size through 40 mesh (sieve inner width: 420 micron)	309-OR	100%

**Average Analysis of Standard Production**

Drop Point, Mettler	140°C (284°F)
Density	0.98 g/cc
Viscosity @ 150°C (302°F) Brookfield	8500 cps
Hardness @ 25°C (77°F)	<0.5 dmm
Bulk Density	529 kg/m <sup>3</sup> (33 lb/ft <sup>3</sup> )

**Product Form and Packaging**

Product is supplied as a white to off-white powder, essentially free of foreign material. It is packaged in 25 kg four-ply Kraft bags and shipped on pallets, 40 bags to a pallet, net weight 1,000 kgs, and stretch-wrapped. Pallet loads are approximately 1.32m long, 1.04m wide, and 1.29m high (52 inches x 42 inches x 51 inches)

**Safety Precautions**

A-C\* polyethylenes and copolymers are regarded as non-hazardous when exposure is controlled by using accepted industrial hygiene practices. Consult our Material Safety Data Sheet for specific recommendations on safe handling.

**Additional Information**

To place an order, obtain prices, samples and technical information, please refer to the address list on the back of this sheet for the office serving your area.

**Honeywell**

## Material Safety Data Sheet

### A-C® Oxidized Polyethylene Homopolymers

**EYES:** Non-eye irritant. Particulates may cause mechanical irritation.

**INHALATION:** Treat powder as nuisance particulates.

**INGESTION:** No effects known. Low toxicity.

**DELAYED EFFECTS:** None known.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

Ingredient Name	NTP Status	IARC Status	OSHA List
* No ingredients listed in this section *			

#### 4. FIRST AID MEASURES

**SKIN:** Wash with water and soap.

**EYE:** Wash with water for 15 minutes. If irritation persists, consult physician.

**INHALATION:** For inhalation of powder, remove to fresh air.

**INGESTION:** Not expected to occur.

**ADVICE TO PHYSICIAN:** No specific advice. Treat according to symptoms present.

#### 5. FIRE FIGHTING MEASURES

##### FLAMMABLE PROPERTIES:

FLASH POINT:	> 400°F (> 255°C)
FLASH POINT METHOD:	Open cup.
AUTOIGNITION TEMPERATURE:	None known.
UPPER FLAME LIMIT (Volume % in air):	Not applicable.
LOWER FLAME LIMIT (Volume % in air):	Not applicable.
FLAME PROPAGATION RATE (Solids):	Unknown.
OSHA FLAMMABILITY CLASS:	Combustible solid.

**Honeywell**

## Material Safety Data Sheet

### A-C® Oxidized Polyethylene Homopolymers

**EXTINGUISHING MEDIA:**

Carbon dioxide, dry chemical or fine water spray. Avoid water stream on molten burning material as it may scatter and spread the fire.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:**

Fire point > 313°C. Melts in proximity to fires causing slippery floors and stairs. Static charges on powders or powders in liquids may ignite combustible atmospheres. See NFPA Bulletin 654, "Prevention of Fires and Dust Explosions in the Chemical, Dye, Pharmaceutical, and Plastics Industries" for safe handling procedures.

**SPECIAL FIREFIGHTING PRECAUTIONS/INSTRUCTIONS:**

Wear self-contained breathing apparatus approved by NIOSH. Watch footing on floors and stairs because of possible melting and spreading of material. Use water spray to keep containers cool.

**6. ACCIDENTAL RELEASE MEASURES**

**IN CASE OF SPILL OR OTHER RELEASES:** (Always wear recommended personal protective equipment.)  
Remove ignition sources from the powdered grades. Keep away from heat or flame. Sweep up with a minimum of dusting. Collect in container, e.g. fiberboard drum or carton.

Spills and releases may have to be reported to Federal and/or local authorities. See the Regulatory Information section (#15) regarding reporting requirements.

**7. HANDLING AND STORAGE**

**NORMAL HANDLING:** (Always wear recommended personal protective equipment.)

Under conditions of storage, vapors may collect in the headspace of the containers causing an odor (sometimes pungent) during unpacking of these products. Avoid breathing vapors when opening containers, and fumes from heating operations. Avoid spillage which can cause very slippery conditions on floors. Use good personal hygiene and housekeeping.

**STORAGE RECOMMENDATIONS:**

Avoid excessive heat. Do not store near strong oxidizing agents and amines.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****ENGINEERING CONTROLS:**

Use adequate ventilation when opening product containers, during heating processes, or if dusty conditions prevail when handling powdered materials. For storage and ordinary handling, general ventilation is adequate.

**PERSONAL PROTECTIVE EQUIPMENT:****SKIN PROTECTION:**

Protective garments, i.e. gloves with long sleeves, when handling molten material.

**EYE PROTECTION:**

Chemical goggles around molten material and in dusty conditions.

**Honeywell**

## Material Safety Data Sheet

### A-C® Oxidized Polyethylene Homopolymers

**RESPIRATORY PROTECTION:**

Use a NIOSH approved dust respirator with powdered grades if dusty conditions prevail. When opening product containers and during melting or conveying in molten state, use an organic vapor respirator.

**ADDITIONAL RECOMMENDATIONS:**

Not generally required.

**EXPOSURE GUIDELINES:**

(Guidelines exist for the following ingredients)

**Ingredient Name****ACGIH TLV****OSHA PEL****Other Limit**

\* No ingredients listed in this section \*

\* = Limit established by Honeywell International

\*\* = Workplace Environmental Exposure Level (AIIIA)

\*\*\* = Biological Exposure Index

Other exposure limits for the decomposition products normally associated with product use are as follows:

Powdered forms may generate nuisance particulates upon handling: ACGIH TLV = 10 mg/m<sup>3</sup> of total particulates.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>APPEARANCE:</b>	A-C 6702 is grease-like; other grades are white pellets, prills, or powder.
<b>PHYSICAL STATE:</b>	Solid.
<b>ODOR:</b>	Characteristic waxy odor.
<b>SPECIFIC GRAVITY:</b>	(Water = 1.0) 0.85 - 1.00
<b>SOLUBILITY IN WATER:</b>	(Weight %) Negligible
<b>pH:</b>	Not applicable.
<b>BOILING POINT:</b>	Not applicable.
<b>MELTING POINT:</b>	88 - 140°C (190 - 284°F)
<b>VAPOR PRESSURE:</b>	Not applicable.
<b>VAPOR DENSITY:</b>	(Air = 1.0) Not applicable.
<b>EVAPORATION RATE:</b>	Not applicable. Compared to: Not applicable.
<b>% VOLATILES:</b>	Not applicable.
<b>FLASH POINT:</b>	> 490° (> 255°C)

(Flash point method and additional flammability data are found in Section 5.)



**Honeywell**

## Material Safety Data Sheet

### A-C° Oxidized Polyethylene Homopolymers

#### 10. STABILITY AND REACTIVITY

**NORMALLY STABLE?** (Conditions to Avoid)  
Stable at normal conditions.

**INCOMPATIBILITIES:**  
Strong oxidizing agents and amines.

**HAZARDOUS DECOMPOSITION PRODUCTS:**  
Depending on conditions of fire, CO, CO<sub>2</sub>, and combustible gases may be generated.

**HAZARDOUS POLYMERIZATION?**  
Will not occur.

#### 11. TOXICOLOGICAL INFORMATION

**IMMEDIATE (ACUTE) EFFECTS:**  
Acute oral toxicity in rats: LD<sub>50</sub> > 2500 mg/kg.

**DELAYED (SUBCHRONIC & CHRONIC) EFFECTS:**  
Not determined.

**OTHER DATA:**  
No other data developed.

#### 12. ECOLOGICAL INFORMATION

No data have been developed on this subject. These polymeric products are not soluble in water. They are not considered biodegradable.

#### 13. DISPOSAL CONSIDERATIONS

**RCRA:**  
Is the unused product a RCRA hazardous waste if discarded? No.  
If yes, the RCRA ID number is:

**OTHER DISPOSAL CONSIDERATIONS:** Discard as non-hazardous organic solid waste.

The information offered here is for the product as shipped. Use and/or alteration to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

**Honeywell**

## Material Safety Data Sheet

### A-C® Oxidized Polyethylene Homopolymers

#### 14. TRANSPORT INFORMATION

US DOT HAZARD CLASS: Not regulated.

US DOT ID NUMBER: Not applicable.

For additional information on shipping regulations affecting this material, contact the information number found on the first page.

#### 15. REGULATORY INFORMATION

##### TOXIC SUBSTANCES CONTROL ACT (TSCA):

TSCA INVENTORY STATUS: Products are listed on the TSCA Chemical Inventory.

OTHER TSCA ISSUES: None.

##### SARA TITLE III/CERCLA:

RQs &amp; TPOs

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPOs) exist for the following ingredients.

<u>Ingredient</u>	<u>SARA/CERCLA RQ (lbs)</u>	<u>SARA EHS TPO (lbs)</u>
* No ingredients listed in this section *		

Spills/releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center (1-800-424-8802) and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: None

##### SARA 313 TOXIC CHEMICALS:

The following ingredients are SARA 313 "Toxic Chemicals". CAS #'s and wt. % are found in section #2.

<u>Ingredient</u>	<u>Comment</u>
* No ingredients listed in this section *	

##### STATE RIGHT TO KNOW:

In addition to the ingredients found in section 2, the following are listed for state right-to-know purposes:

<u>Ingredient</u>	<u>Wt. %</u>	<u>Comment</u>
* No ingredients listed in this section *		

Oct 08 01 02:47p

vercingetorix

2993449

p.22

60°d 76101

**Honeywell**

## Material Safety Data Sheet

### A-C<sup>®</sup> Oxidized Polyethylene Homopolymers

#### ADDITIONAL REGULATORY INFORMATION:

See Allied Technical Data Bulletin GEN-002 for FDA related information.

#### WHMIS CLASSIFICATION (CANADA):

Not subject to WHMIS regulations.

#### FOREIGN INVENTORY STATUS:

Canadian DSL (Domestic Substances List)

EINECS (European Inventory of Existing Commercial Chemical Substances)

Australian Chemical Inventory

Japanese Chemical Inventory

#### 16. OTHER INFORMATION

CURRENT ISSUE DATE: 2/00

PREVIOUS ISSUE DATE: 3/98

#### CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:

Changed from AlliedSignal logo to Honeywell logo

OTHER INFORMATION: None

MSDS Number: ACPA0004

Current Issue Date: 2/00

Page 7 of 7

973456154 P.09/09

HONEYWELL

OCT-08-2001 14:32



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENT AND TRADEMARKS  
Washington, D.C. 20231  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/615,507	07/13/2000	Claude Q.C. Hayes	P-5534-27	4652

7590 01/04/2002  
Bauer & Schaffer LLP  
114 Old Country Road  
Mineola, NY 11501

EXAMINER

BISSETT, MELANIE D

ART UNIT

PAPER NUMBER

1711

DATE MAILED: 01/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.



## UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS  
UNITED STATES PATENT AND TRADEMARK OFFICE  
WASHINGTON, D.C. 20231  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
-----------------	-------------	----------------------	---------------------

EXAMINER

ART UNIT

PAPER NUMBER

DATE MAILED:

## Notice of Non-Compliant Amendment (37 CFR 1.121)

The amendment filed on 12/19/07 is considered non-compliant because it has not been submitted in the format required under 37 CFR 1.121, as amended on September 8, 2000 (see 65 Fed. Reg. 54603, Sept. 8, 2000, and 1238 O.G. 77, Sept. 19, 2000).

- ☐ 1. The amendment does not include a clean version of the replacement paragraph(s)/section(s). 37 CFR 1.121(b)(1)(ii).
- ☐ 2. The amendment does not include a marked-up version of the replacement paragraph(s)/section(s). 37 CFR 1.121(b)(1)(iii).
- ☐ 3. The amendment does not include a clean version of the amended claim(s). 37 CFR 1.121(c)(1)(i).
- ☒ 4. The amendment does not include a marked-up version of the amended claim(s). 37 CFR 1.121(c)(1)(ii).
- ☐ 5. Other \_\_\_\_\_

- ☐ **PRELIMINARY AMENDMENT:** Unless applicant re-submits the preliminary amendment in compliance with revised 37 CFR 1.121 within ONE MONTH of the mail date of this letter, examination on the merits may commence without entry of the originally proposed preliminary amendment. This notice is not an action under 35 U.S.C. 132, and this ONE MONTH time limit is not extendable.

- ☒ **AMENDMENT AFTER NON-FINAL ACTION:** Since the above mentioned reply appears to be *bona fide*, applicant is given a TIME PERIOD of ONE (1) MONTH or THIRTY (30) DAYS from the mailing date of this notice, whichever is longer, within which to supply the omission or correction in order to avoid abandonment. EXTENSIONS OF THIS TIME PERIOD MAY BE GRANTED UNDER 37 CFR 1.136(a).

For your convenience, attached to this correspondence is a copy of an informational flyer (MPEP Bookmark Bulletin on "Simplified Amendment Practice").

Legal Instruments Examiner

04/10/02 12:10 FAX 5167467082

JASPAN 9000 HS

002

#6  
05/13/02  
AS

bp

Matter 36718

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Claude Hayes

Serial No.: 09/615,507

Filed: July 13, 2000

Title: THERMAL CONTROL COMPOSITE

Hon. Commissioner of Patents  
and Trademarks  
Washington, D.C. 20231

DECLARATION

I, Barbara A. Patton, hereby declare that:

I am the Intellectual Property Department Docketing Manager at Jaspán Schlesinger Hoffman  
LLP;

I have first hand knowledge of all facts relating to the matter referenced above.

I docket any and all correspondence received from the Patent and Trademark Office upon its  
receipt in my department.

To date, I have not received any written Notice of Non-Compliant Amendment for the above-  
referenced matter. The first time our office was actually notified of such Notice, was when Examiner  
Bissett actually called our office and brought it to our attention.

I submit herewith a copy of my journal log, which shows all of the files that were due for  
action on February 4, 2002 (the date by which we should have responded to said Notice) and such log  
shows that there was no record of the above-referenced matter.

I further declare that I am authorized to make this Declaration; that all statements made herein  
of my own knowledge are true and that all statements made on information and belief are believed to  
be true; and further that these statements were made with the knowledge that willful false statements  
and the like so made are punishable by fine and imprisonment or both under §1001 of Title 18 of the  
United States Code and the such willful false statements may jeopardize the validity of this patent.

Dated: 4-10-02

Barbara A. Patton  
Barbara A. Patton

01/10/02 12:11 FAX 5167467082

JASPAN 9000 MS

003

2002  
STANDARD  
DIARY

04/10/02 12:14 FAX 5167467082

JASPAN 9000 MS

004

SATURDAY **2** FEBRUARY

33rd day - 332 days follow

09/518,654 RICCHETTI 37416 OAR (4)



04/10/02 12:15 FAX 5167467082

JASPER 9000 MS

0005

FEBRUARY 3 SUNDAY

2002 34th day - 331 days to 2002 35th day - 330 days

001335 668 Sh

04/10/02 12:16 FAX 5167467082

JASPAN 9000 MS

006

MONDAY **4** FEBRUARY

1 days follow 35th day - 330 days follow

04/335 668 Shingo 37252 Fin. OAR (S)

04/10/02 12:18 FAX 5167467082

JAPAN 8000 HS

0007

FEBRUARY **5** TUESDAY

2002 36th day - 329 days follow

Anniversary of the Constitution (Mexico)

04/10/02 12:10 FAX 5167467082

JASPAN 9000 MS

@001

**JASPAN SCHLESINGER HOFFMAN LLP**  
Attorneys at Law  
300 Garden City Plaza  
Garden City, New York 11530-3324  
(516) 746-8000 (telephone)  
(516) 393-8282 (facsimile)

---

**FACSIMILE COVER SHEET**

**PLEASE DELIVER IMMEDIATELY TO:**

NAME: Examiner Melanie Bissett  
FIRM/COMPANY: USPTO  
TELECOPIER NUMBER: 703-872-9052  
OFFICE TELEPHONE NUMBER: 703-308-6539  
SENDER: Bobbi Patton  
MATTER: Serial No. 09/615,507  
DATE TRANSMITTED: April 10, 2002  
OUR FILE NO.: 36718  
PAGES (including this cover page): 7

---

**IF YOU DO NOT RECEIVE THE TOTAL TRANSMISSION PLEASE CALL (516) 746-8000, EXT. 414**

---

**COMMENTS/SPECIAL INSTRUCTIONS:**

Please see attached Declaration, as per our telephone conversation yesterday. Thank you for your assistance towards this matter.

---

**SENT BY:                      DATE:                      TIME:**

---

THIS MESSAGE IS INTENDED FOR THE USE OF THE INDIVIDUAL OR ENTITY TO WHICH IT IS ADDRESSED AND MAY CONTAIN INFORMATION THAT IS PRIVILEGED, CONFIDENTIAL AND EXEMPT FROM DISCLOSURE UNDER APPLICABLE LAW, IF THE READER OF THIS MESSAGE IS NOT THE INTENDED RECIPIENT, OR THE EMPLOYEE OR AGENT RESPONSIBLE FOR DELIVERING THE MESSAGE TO THE INTENDED RECIPIENT, YOU ARE HEREBY NOTIFIED THAT ANY DISSEMINATION, DISTRIBUTION OR COPYING OF THIS COMMUNICATION IS STRICTLY PROHIBITED. IF YOU HAVE RECEIVED THIS COMMUNICATION IN ERROR, PLEASE NOTIFY US IMMEDIATELY BY TELEPHONE AND RETURN THE ORIGINAL MESSAGE TO US AT THE ABOVE ADDRESS VIA THE U.S. POSTAL SERVICE. THANK YOU.

04/12/02 13:24 FAX 5167-87082

JASPAN 9000-NS

002

BP (address change)

#7  
04/13/02  
AS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Claude Hayes  
Serial No: 09/615,507  
Filed: July 13, 2000  
Title: THERMAL CONTROL COMPOSITE

Hon. Commissioner of Patents  
and Trademarks  
Washington, D.C. 20231

CHANGE OF ATTORNEY'S ADDRESS

Sir:

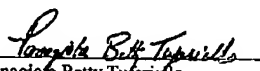
Please note that Bauer & Schaffer, LLP has merged with the law firm Jaspan Schlesinger Hoffman LLP. This change took place the first week of April 2001.

Please address all further correspondence to the new address stated below:

JASPAN SCHLESINGER HOFFMAN LLP  
300 Garden City Plaza  
Garden City, New York 11530  
Tel: (516) 393-8239  
Fax: (516) 393-8282

Please change your records accordingly.

Dated: April 12, 2002

  
Panagiotis Betty Tufariglo  
Registration No.: 40,851  
Jaspan Schlesinger Hoffman LLP  
300 Garden City Plaza  
Garden City, NY 11530

04/12/02 13:23 FAX 5167467000

JASPAN 9000 MS

001

**JASPAN SCHLESINGER HOFFMAN LLP**  
Attorneys at Law  
300 Garden City Plaza  
Garden City, New York 11530-3324  
(516) 746-8000 (telephone)  
(516) 393-8282 (facsimile)

---

**FACSIMILE COVER SHEET**  
**PLEASE DELIVER IMMEDIATELY TO:**

NAME: Examiner Melanie Bissett  
FIRM/COMPANY: USPTO  
TELECOPIER NUMBER: 703-872-9052  
OFFICE TELEPHONE NUMBER: 703-308-6539  
SENDER: Bobbi Patton  
MATTER: Serial No. 09/615,507  
DATE TRANSMITTED: April 12, 2002  
OUR FILE NO.: 36718  
PAGES (including this cover page): 2

---

IF YOU DO NOT RECEIVE THE TOTAL TRANSMISSION PLEASE CALL (516) 746-8000, EXT. 424

**COMMENTS/SPECIAL INSTRUCTIONS:**

---

SENT BY: DATE: TIME:

THIS MESSAGE IS INTENDED FOR THE USE OF THE INDIVIDUAL OR ENTITY TO WHICH IT IS ADDRESSED AND MAY CONTAIN INFORMATION THAT IS PRIVILEGED, CONFIDENTIAL AND EXEMPT FROM DISCLOSURE UNDER APPLICABLE LAW. IF THE READER OF THIS MESSAGE IS NOT THE INTENDED RECIPIENT, OR THE EMPLOYEE OR AGENT RESPONSIBLE FOR DELIVERING THE MESSAGE TO THE INTENDED RECIPIENT, YOU ARE HEREBY NOTIFIED THAT ANY DISSEMINATION, DISTRIBUTION OR COPYING OF THIS COMMUNICATION IS STRICTLY PROHIBITED. IF YOU HAVE RECEIVED THIS COMMUNICATION IN ERROR, PLEASE NOTIFY US IMMEDIATELY BY TELEPHONE AND RETURN THE ORIGINAL MESSAGE TO US AT THE ABOVE ADDRESS VIA THE U.S. POSTAL SERVICE. THANK YOU.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/615,507	07/13/2000	Claude Q.C. Hayes	P-5534-27	4652

7590 06/27/2002  
Jaspan Schlesinger Hoffman LLP  
300 Garden City Plaza  
Garden, NY 11530

EXAMINER

BISSETT, MELANIE D

ART UNIT	PAPER NUMBER
----------	--------------

1711

DATE MAILED: 06/27/2002

Please find below and/or attached an Office communication concerning this application or proceeding.



UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS  
UNITED STATES PATENT AND TRADEMARK OFFICE  
WASHINGTON, D.C. 20231  
[www.uspto.gov](http://www.uspto.gov)

Paper No.


In re Application of :  
Hayes : DECISION GRANTING PETITION  
Application No. 09/615,507 : TO REMAIL AN OFFICE ACTION  
Filed: 7/13/2000 : AND RESTART PERIOD FOR REPLY  
Attorney Docket No. P-5534-27 :

This is a decision on the petition filed on 4/10/02, requesting that the Office communication mailed on 1/4/02 be supplied with a new mail date and the shortened statutory period for reply set forth in the Office communication be restarted on the new mail date.

The petition is granted.

Petitioner provided a statement that a significant amount of correspondence mailed by the Office between October 13, 2001 and January 4, 2002 when delivery of mail from the Office to certain regions of the country was delayed, including the Office communication mailed on 1/4/02, has not been received by the applicant at the correspondence address of record.

Accordingly, the Office communication originally mailed on 1/4/02 will be remailed and the shortened statutory period that was originally set forth in the Office communication shall be restarted to run from the mail date of the newly supplied Office action or notice.

  
William Krynski, Special Program Examiner,  
Technology Center 1700  
(703) 308-2376





UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/615,507	07/13/2000	Claude Q.C. Hayes	P-5534-27	4652

7590 01/24/2003  
Jaspan Schlesinger Hoffman LLP  
300 Garden City Plaza  
Garden, NY 11530

EXAMINER

BISSETT, MELANIE D

ART UNIT	PAPER NUMBER
----------	--------------

1711

DATE MAILED: 01/24/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

# **Notice of Abandonment**

Application No.

09/615,507

Examiner

Melanie D. Bissett

Applicant(s)

HAYES, CLAUDE Q.C.

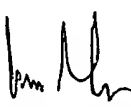
Art Unit

1711

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

This application is abandoned in view of:

1. ☒ Applicant's failure to timely file a proper reply to the Office letter mailed on 27 June 2002.
  - (a) ☐ A reply was received on \_\_\_\_\_ (with a Certificate of Mailing or Transmission dated \_\_\_\_\_), which is after the expiration of the period for reply (including a total extension of time of \_\_\_\_\_ month(s)) which expired on \_\_\_\_\_.
  - (b) ☐ A proposed reply was received on \_\_\_\_\_, but it does not constitute a proper reply under 37 CFR 1.113 (a) to the final rejection. (A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114).
  - (c) ☐ A reply was received on \_\_\_\_\_ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
  - (d) ☒ No reply has been received.
2. ☐ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
  - (a) ☐ The issue fee and publication fee, if applicable, was received on \_\_\_\_\_ (with a Certificate of Mailing or Transmission dated \_\_\_\_\_), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
  - (b) ☐ The submitted fee of \$\_\_\_\_\_ is insufficient. A balance of \$\_\_\_\_\_ is due.  
The issue fee required by 37 CFR 1.18 is \$\_\_\_\_\_. The publication fee, if required by 37 CFR 1.18(d), is \$\_\_\_\_\_.
  - (c) ☐ The issue fee and publication fee, if applicable, has not been received.
3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
  - (a) ☐ Proposed corrected drawings were received on \_\_\_\_\_ (with a Certificate of Mailing or Transmission dated \_\_\_\_\_), which is after the expiration of the period for reply.
  - (b) ☐ No corrected drawings have been received.
4. ☐ The letter of express abandonment which is signed by the attorney or agent of record, the assignee of the entire interest, or all of the applicants.
5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34(a)) upon the filing of a continuing application.
6. ☐ The decision by the Board of Patent Appeals and Interference rendered on \_\_\_\_\_ and because the period for seeking court review of the decision has expired and there are no allowed claims.
7. ☐ The reason(s) below:

  
James J. Seldieck  
Supervisory Patent Examiner  
Technology Center 1700

Petitions to revive under 37 CFR 1.137(a) or (b), or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.

JAN 31 2003 2:41 PM FR

TO 917034183848

P.02

Attorney Docket: 432580.0001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Claude Q.C. Hayes

Serial No.: 09/615,507

Examiner: Bissett, Melanie D.

Filed: July 13, 2000

Group Art Unit: 1711

For: See Attached

Commissioner for Patents  
Washington, D.C. 20231

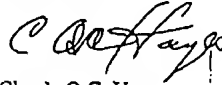
POWER TO INSPECT/COPY

Sir:

Please permit the following person(s) to inspect and make copies of the above-identified application:

Rick Jordon, Darryl Lucas, and David Brown  
World Patent Services  
2001 Jefferson Davis Highway, Suite 304B  
Arlington, VA 22202

Respectfully,



Claude Q.C. Hayes

